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3D WORLD

RANGO
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3D WORLD

presents

ILM

F ollowing their collaboration on the Pirates of the Caribbean franchise, Industrial Light & Magic and director Gore Verbinski have teamed up once again to produce their first-ever feature animation, Rango. After 35 years of high-quality, award-winning special effects, ILM's leap into this field is one that's been long in coming but well worth the wait.

The movie provides a new twist on the well-worn CG animation genre, with near-photoreal characters and locations, and a gritty, hostile world. It's a bold statement of intent, and a welcome change from the endless stream of cookie-cutter, kid-friendly output of recent years.

With Rango featuring over 130 individual characters and the whole production taking nearly 80,000 man-hours to animate, the production really put the studio's pipeline to the test. To find out more about the challenges facing the team and their unorthodox approach to CG movie-making, turn to page 36 for behind-the-scenes access.

And, finally, our thanks to ILM's technicians, who kindly rendered this exclusive cover image for us.

rangomovie.com

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Welcome to 3D WORLD

Why, after all these years, are we still playing the waiting game?

About 15 years ago, I created my first animation. It was very simply lit and keyframed, and rendered at 320x240 because otherwise I'd still be doing it now. It was painstakingly created on a PowerMac running at 120MHz. The phone in your pocket is more powerful.

Eight Macs later, I now have a multi-core system roughly 300 times faster than my old PowerMac. As a rule of thumb, I've looked to upgrade whenever I can double the processing power. So far this has been every two or three years, and with the advent of multiple multi-core processors, looks set to continue for the foreseeable future.

But given the frankly ludicrous amount of power in my current system, plus the capacity to hold nearly three full-length Hollywood DVD movies entirely in RAM, how come I still have to wait for stuff to happen?

I guess, like the old rule that the amount of work expands to fit the time available, so computing power will always be throttled by the new code that programmers throw at it. Before, it was a simple bit of raytracing and a nice texture map; now we've got volumetrics and subsurface scattering and physics simulations and global illumination... and all in HD.

Silver lining?

So where is our long-awaited paradigm shift in computing coming from? Well, it just might be that 'cloud' thing that everyone's been talking about. With a super-fast connection to every computer on the planet, any task that can be parallelised and distributed – such as renders or physical simulations – would be completed in a matter of moments. After all, how many computers out there are currently up and running and only being used to talk to friends on Facebook, utilising a tiny fraction of their power? Us poor CPU-starved CG artists could be using that!

Even the largest render farm or government computing project pales into insignificance when compared to the number of processors sitting idly by (silently plotting mankind's downfall, no doubt). Still, until the wretched progress bar disappears for good, you can make good use of that downtime by reading this month's issue of 3D World. Hope you enjoy it!

Steve Jarratt, editor

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Introducing our advisory board

Each issue, our panel of leading figures from across the CG industry give us their advice and help

Spotlight on...

Meet all of our advisory board members at **3dworldmag.com/board**

Gustavo Capote
ART DIRECTOR, NEOSCAPE

A recognised master of architectural visualisation, Gus has specialised in this precise discipline for over 10 years. A sought-after speaker at industry conferences, he has received numerous professional accolades, including the American Society of Architectural Illustrators' Award of Excellence and CGarchitect's Best Still Image Award. His work has featured in Ballistic Publishing's popular Exposé and Elemental books.

We couldn't think of anyone better to put Chaos Group's major revision of the leading render plug-in V-Ray to the test: you can read Gus's review of V-Ray 2.0 on page 98.

Tim Alexander
VFX supervisor, ILM

Stuart Adcock
Technical art director, Ninja Theory

Jordi Barés
Joint head of 3D, The Mill

Pascal Blanché
Senior artist, Frontier Developments

Tim Brade
Technical director, Aardman Animations

Rob Bredow
CTO, Sony Pictures Imageworks

Gustavo Capote
Art director, Neoscape

Andrew Daffy
Director, The House of Curves

Lee Danskin
Training development director, Escape Studios

Jonathan Davies
Head of 3D production, The Moving Picture Company

Sofronis Efstathiou
MA 3D programme leader, National Centre for Computer Animation, Bournemouth University

Paul Franklin
VFX supervisor, Double Negative

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Founder, Alex Morris Visualisation

Ximo Peris
Creative director, Crystal CG

Shelley Page
Head of International Outreach, DreamWorks Animation

Robi Roncarelli
Editor and publisher, PIXEL

Jolyon Webb
Art manager, TruSim

This issue's contributors

Chad Robert Morgan
SENIOR TECHNICAL ARTIST, DOUBLEHELIX GAMES

Chad manages character rigging, tool development, export pipelines and training for the high-flying games developer. On page 70, he shares his production techniques for rigging characters for animation.

Craig Barr
TECHNICAL MARKETING SPECIALIST, AUTODESK

Craig eats and sleeps Mudbox and Maya, running the Mudbox blog on The Area. He shares his Mudbox workflow on page 82 as he sculpts and paints a stunning tree troll design, with hours of video training too!

Brian Haberlin
ARTIST & TRAINER

3D World regular Brian draws, paints, renders and teaches in a wide-ranging and acclaimed career spanning comics, print and online. On page 76, he shares his knowledge to help you get more out of your character poses.

William Eggington
OWNER, EGGINGTON PRODUCTIONS

William has been working in 3D animation for over a decade, supporting the animation and broadcast industries. He brings his expertise to bear on the newly released messiah:studio 5 on page 102.

Antonis Kotzias
CG SUPERVISOR/OWNER, YAFKA

Emmy-nominated Antonis has worked on projects including Happy Feet, Charlie and the Chocolate Factory and Harry Potter. On page 110, he revisits an unusual recent cinematics project for the National Geographic Channel for our Debrief section.

Next issue on sale 7 April 2011

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3D WORLD

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Win a copy of PFMatchit or PFhoe Pro from The Pixel Farm
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KEY MOMENTS IN CG HISTORY REVISITED

EVERY ISSUE

ON THE DISC

ESSENTIAL 3D ASSETS AND VIDEO TRAINING

3D WORLD
Community
Images and opinion from you, the 3D World readers

Damir used his existing models to create this scene, which was composited and tweaked in Photoshop CS5

3D Image of the month

Damir Martin wins a copy of Poser Pro 2010, worth $499. Linking pro production tools and ready-to-use 3D assets, Poser Pro saves development time and resources.

smithmicro.com

SMITHMICRO
SOFTWARE

POSER PRO 2010

3dworldmag.com

Portfolio

This month's selection of new 3D artwork features dinosaurs, goblins and a future city

■ **Artist** Damir Martin
Title Moment Before 'Extinction'
Software ZBrush, 3ds Max, mental ray, Photoshop
"I'm a computer graphics generalist and freelance artist. This piece took around four days, on and off, to complete, since I used my older models. There's a back story for this image: what if dinosaurs weren't extinct? What if most of them were simply stored away instead? Here, you're witnessing an entire dinosaur species being 'stored' into what we like to call a black hole. The biggest challenge was to get as seamless a composite as possible through countless layers and passes between dinosaurs, the background, footprints and what-not. The best bits were the final stages, when it all starts blending in. That's the best experience with almost any piece."
damir@damirgmartin.com
damirgmartin.com

❝ The biggest challenge was getting the ZBrush details into 3ds Max and rendering it without crashing ❞

◄ **Artist** Robin Benes
Title GOR: the Goblin Pirate
Software ZBrush, 3ds Max, Hair Farm, mental ray, Photoshop
"I started in 3D 11 years ago. Since 2008, I've been freelancing for companies in the game, movie and commercial CG industry.

"Originally, I had some crazy ideas for this piece, so I tried new techniques such as particle and cloth simulations – but I left all those tests behind and moved to the stuff I know best. The biggest challenge was getting all the details from ZBrush into 3ds Max and rendering it in sufficient resolution without crashing. With the Decimation Master plug-in for ZBrush, everything changed: I simply exported enough decimated detailed geometry. For little details, I used normal maps from higher ZBrush SubD levels. Some parts of the model were decimated, some were displaced."
tes@tes3d.com
tes3d.com

▲ **Artist** Romain Ferchat
Title The Consigliere
Software ZBrush, 3ds Max, V-Ray, RPManager, Nuke
"Since 2009, I've been a junior infographist at Le Truc, a 3D and post-production studio in Geneva, Switzerland. Before that, I was a student at a 3D school in France. For this project, I was inspired by Sergio Leone, Francis Ford Coppola and Martin Scorcese movies: the way they use light to create atmosphere without all the post-production we use today, and the charisma of the actors. I started this character last year, but it wasn't really what I was expecting, so I started it again recently from the same base mesh.

"The image took me about three weeks, working for two hours a day, five days per week. For modelling the base mesh, I used 3ds Max 2008. All the sculpts were done in ZBrush – and the face texturing too, using Spotlight. It was rendered with 3ds Max 2009 and V-Ray 1.5. RPManager was really useful for the pass rendering. Finally, all the compositing was done with Nuke. The workflow was basic, with not a lot of work on texture but a lot of compositing."
romainferchat.fr

Artist Maria Kosheleva
Title Shells
Software ZBrush, Maya, mental ray, Photoshop

"I'm inspired by nature: when I see how many incredible creatures and views can be created... Also photography that shows the beauty of nature: photo sites are my main inspiration when I'm in the office. I study them and find new ideas.

"I'm not sure how long this image took to make, because I was doing it in coffee breaks at work! Maybe a week or less? I used Maya Paint Effects to texture the shells: no Photoshop was used in the texturing process, only for slight colour correction afterwards. Painting was a pure joy: to explore Maya's brushes, finding new ways to use uncommon brushes."

scallyfox@mail.ru
scallyfox.livejournal.com

▲ Artist Dayvid Ryan
Title Rocket Ron
Software Cinema 4D, Photoshop

"I've always been creative; to me, it's a way of life. I work as a freelance illustrator, but my real passion is 3D modelling. I've worked with Cinema 4D for nearly 10 years, on and off, and it's only now that my work has begun to be noticed.

"This character took six weeks: five to build and one to rig. My biggest challenge was getting the rigging and weighting right; I overcame it with video tutorials and lots and lots of practice, until I got it right."
info@dayvidart.com
dayvidart.com

66 I like that this image was completed very quickly: using old assets made for other projects meant the concept stayed fresh 99

■ Artist Stefan Morrell
Title Dock 35
Software 3ds Max, finalRender, Photoshop

"I'm a freelance artist, working in videogames and illustration, and a content creator, selling sets and other assets through **daz3d.com** under the name Stonemason. For my sci-fi pieces, I'm inspired by heavy machinery and film and TV concept designs.

"This image took two nights for set-up, and another for post. I like that this image was completed very quickly: using old assets made for other projects meant that the initial concept stayed fresh.

"Texturing the ship was interesting... I was being lazy and didn't UV-map it: the final image has a mix of camera-projected texture and post-worked texture, painted in Photoshop. In addition to painting details in Photoshop I also composited my passes: a reflection pass, AO, shadow, specular and so on."
3dsmorrell@gmail.com
stefan-morrell.com

Portfolio: *In focus*

Discover how Dennis Kaya Iversholt created this
realistically detailed New York City street scene

■ **Artist** Dennis Kaya Iversholt
Title NYC 43rd Street
Software 3ds Max, V-Ray
and Photoshop
"I'm 30 years old, from
Denmark, and I've been
working professionally with
CG for about three years.
Currently, I work at Cadesign as a 3D generalist,
where my main focus is on texturing, lighting,
rendering and post work.

"I wanted to create a big city image for a while
and since I've always been fascinated by New York,
I decided to create 43rd Street with a view towards
the Chrysler Building and Grand Central Terminal.
The most important thing to me when I created this
image was to get the atmosphere right. To make it
feel like New York. I worked on the image in my spare
time for about a month and a half. This is the most
fun I've ever had working on a 3D image.

"Modelling and lighting the scene was fairly simple,
while creating the surfaces was a bit of a challenge
and required a lot of test renderings. The wet road
surface gave me the biggest headache, but I'm
satisfied with the way it turned out in the end."
mannylatter@hotmail.com
latter.cgsociety.org/gallery

Research and reference
Bringing together all the elements

01 Doing the research
I've never been to New
York, so the first step
was to find out exactly
which street I wanted to
create and then what
kind of taxis, signs,
garbage cans and so on
exist in the city.

02 Reference
To make
everything as accurate
as possible, I used
Google Street View to
get reference pictures of
the buildings and Google
Maps to measure the
road and the distance
between the buildings.
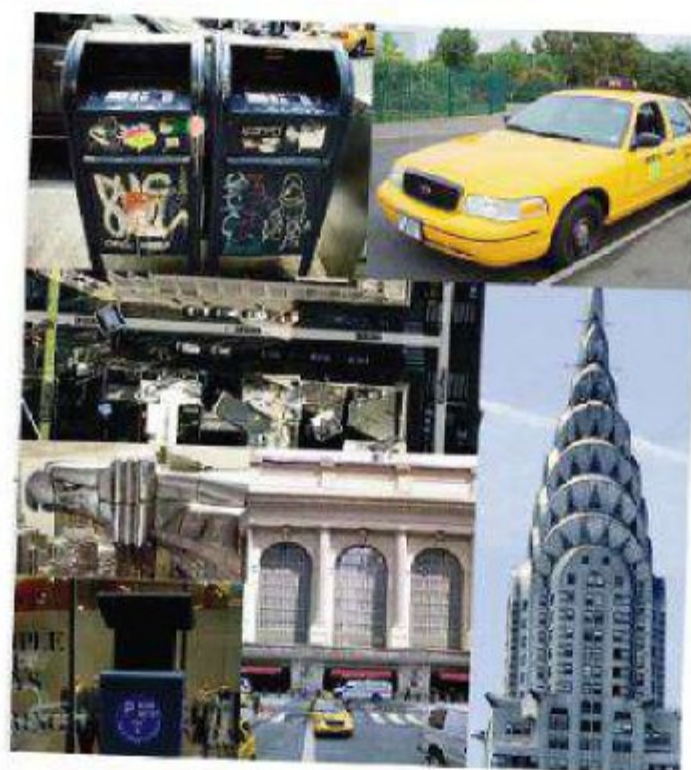
■ Extensive research and reference helped to
give the finished image a strong sense of place

Modelling
Early steps in 3ds Max
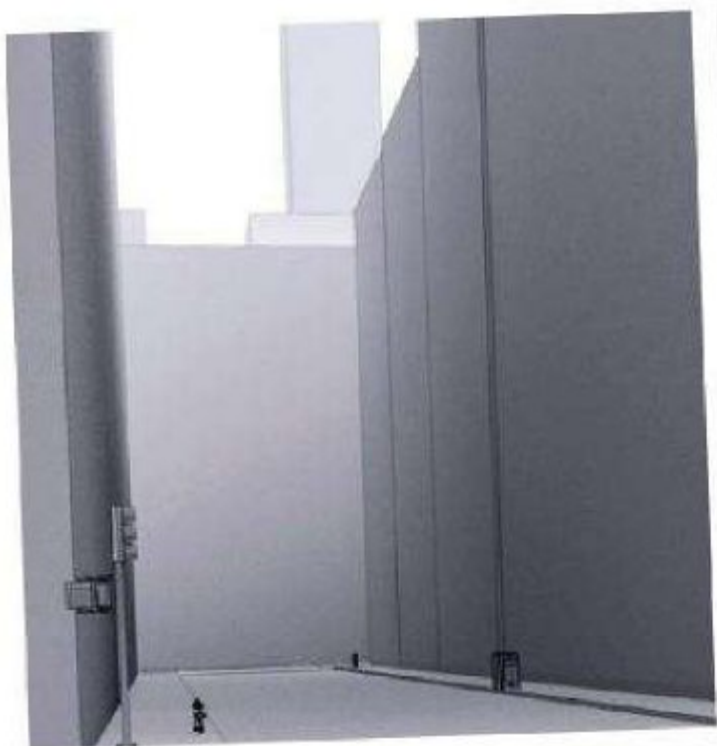
03 Developing a sketch
The first thing I did in 3ds Max was to place
boxes or simple models in the scene. By doing this, I
made sure that the proportions were correct and it
allowed me to test camera and light settings early on.

04 Modelling the buildings
The next step was to create
the buildings. I tried to keep everything
simple and to avoid wasting time on
details that couldn't be seen. I only
modelled the top half of the Chrysler
Building and a small part of the Grand
Central station facade. The buildings
are box modelled.

»
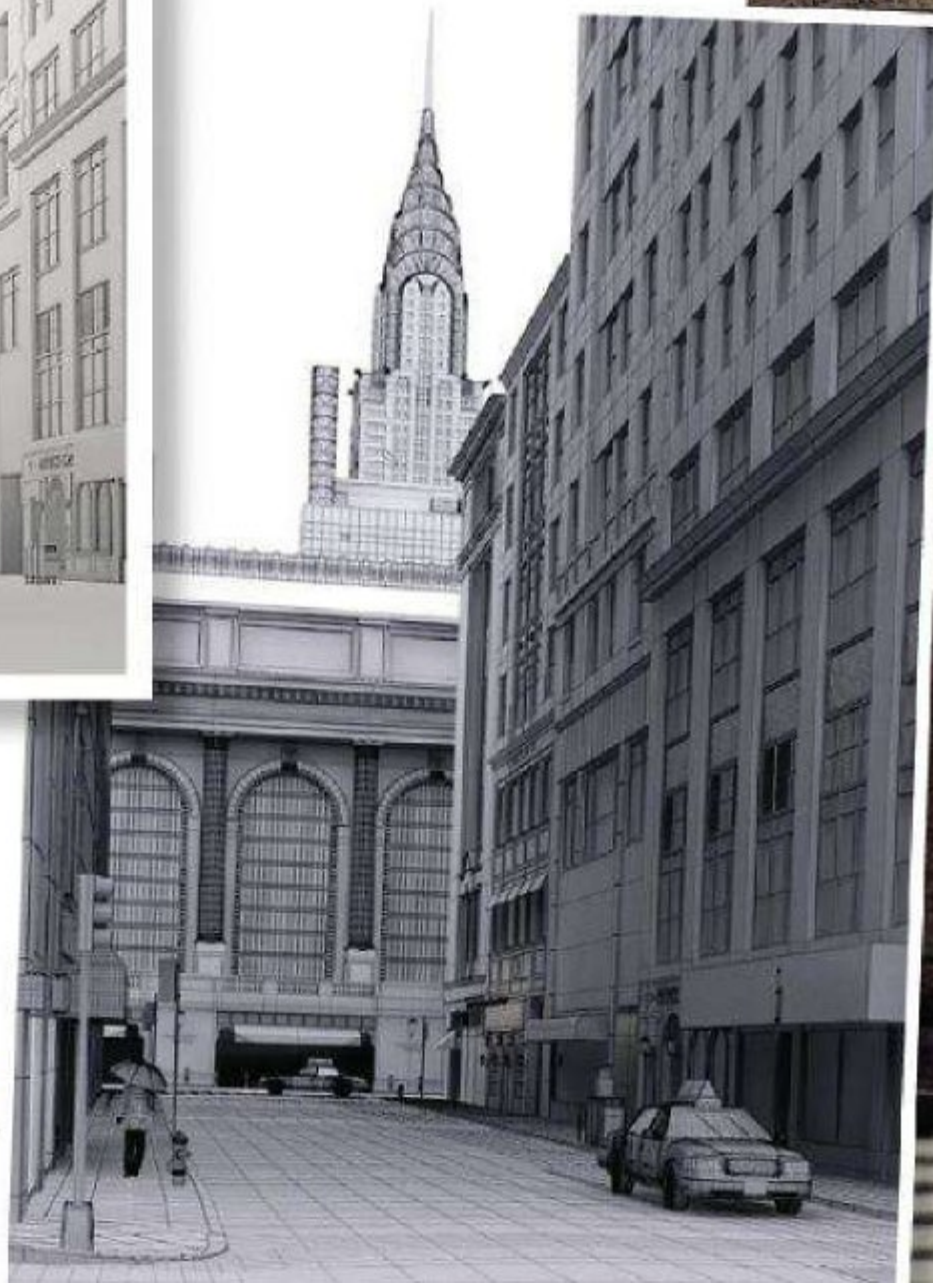
▶ This image of New York's 43rd Street was created using 3ds Max, V-Ray and Photoshop

GRAND CENTRAL TERMINAL

66 The most important thing to me when I created this image was to get the atmosphere right. To make it feel like New York 99
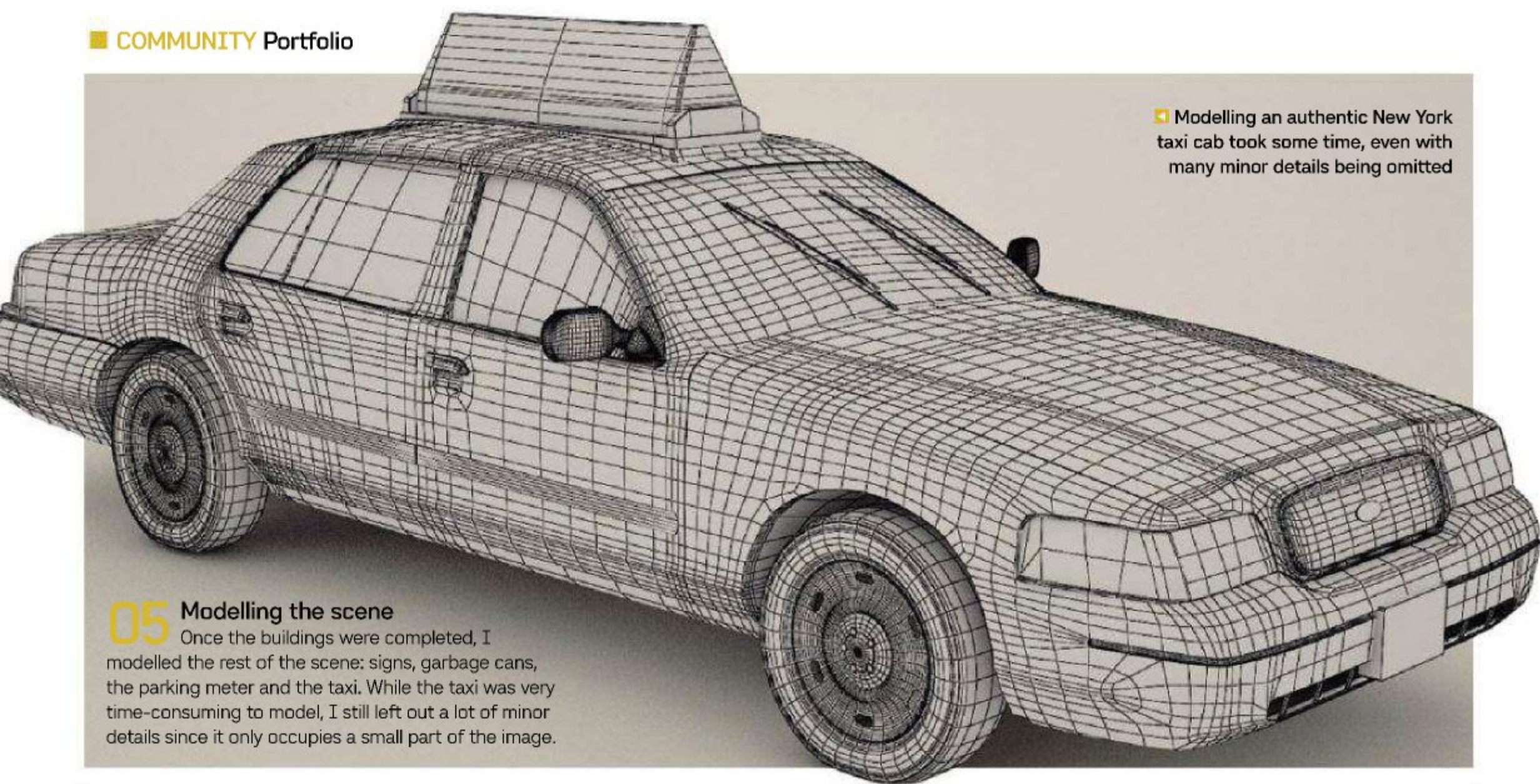
■ Modelling an authentic New York taxi cab took some time, even with many minor details being omitted

05 Modelling the scene

Once the buildings were completed, I modelled the rest of the scene: signs, garbage cans, the parking meter and the taxi. While the taxi was very time-consuming to model, I still left out a lot of minor details since it only occupies a small part of the image.

Lighting and texturing
Adding detail to the image

06 Setting up the lighting

In order to be able to control the sky light and sky reflections separately, I created two identical V-Ray dome lights with HDRI maps. One of them only affected the diffuse light, while the other only affected reflections. For the rest of the light sources in the street scene, I used V-Ray sphere lights.
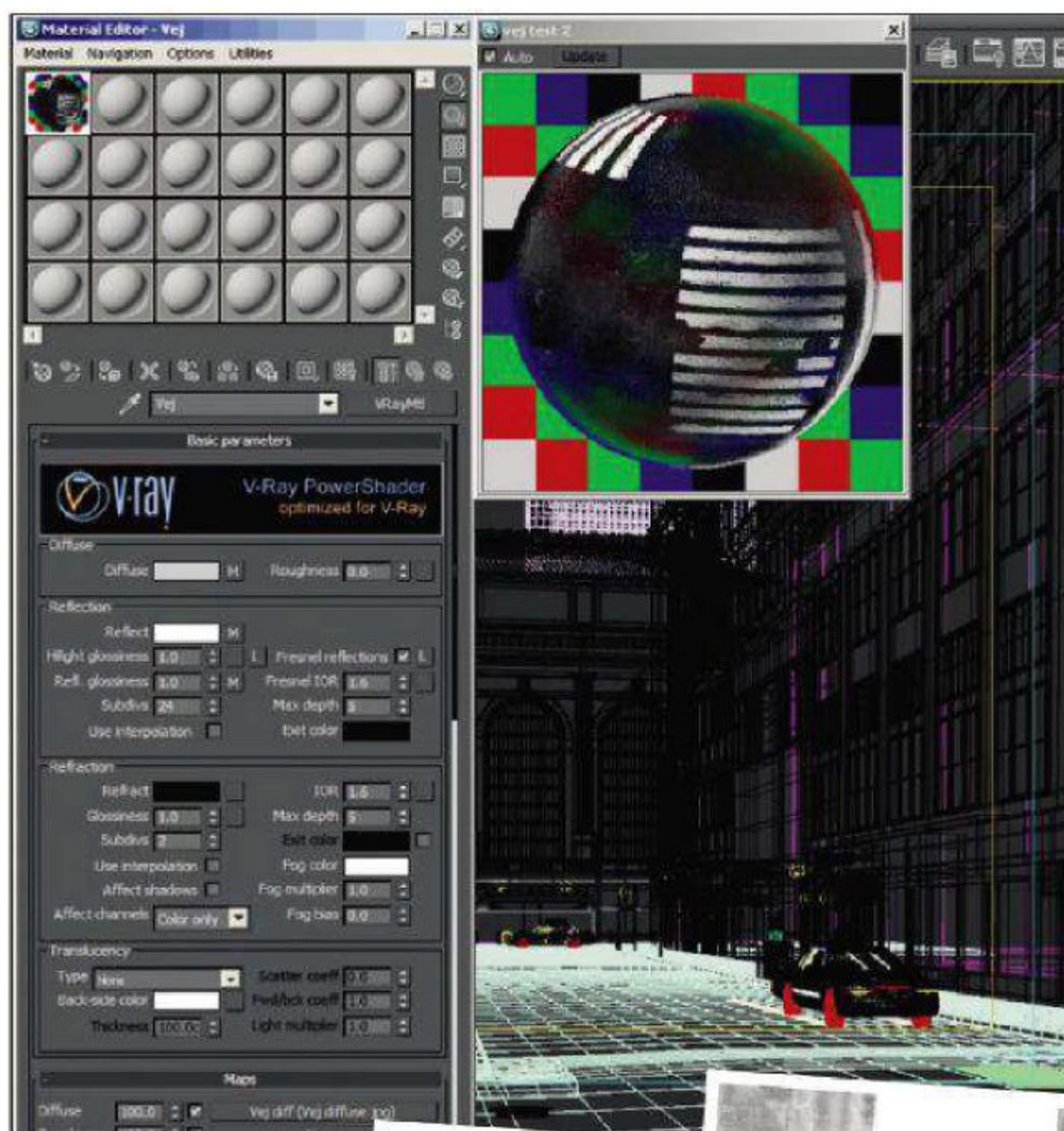
07 Texturing

Next, I unwrapped the buildings and the road, and created textures in Photoshop. For the taxi, I used a V-Ray blend material with dirt and graphics as separate coat materials. The dirt and graphics were placed on the taxi with planar UVW maps.

Rendering and post-production
Finishing touches to bring the Big Apple alive

Z-DEPTH

OCCLUSION

REFLECTION

08 Render settings
I used Adaptive DMC for the image sampler and a standard area filter as the anti-aliasing filter. To create the indirect illumination, I used an irradiance map for the primary bounce, while the secondary bounce was turned off.
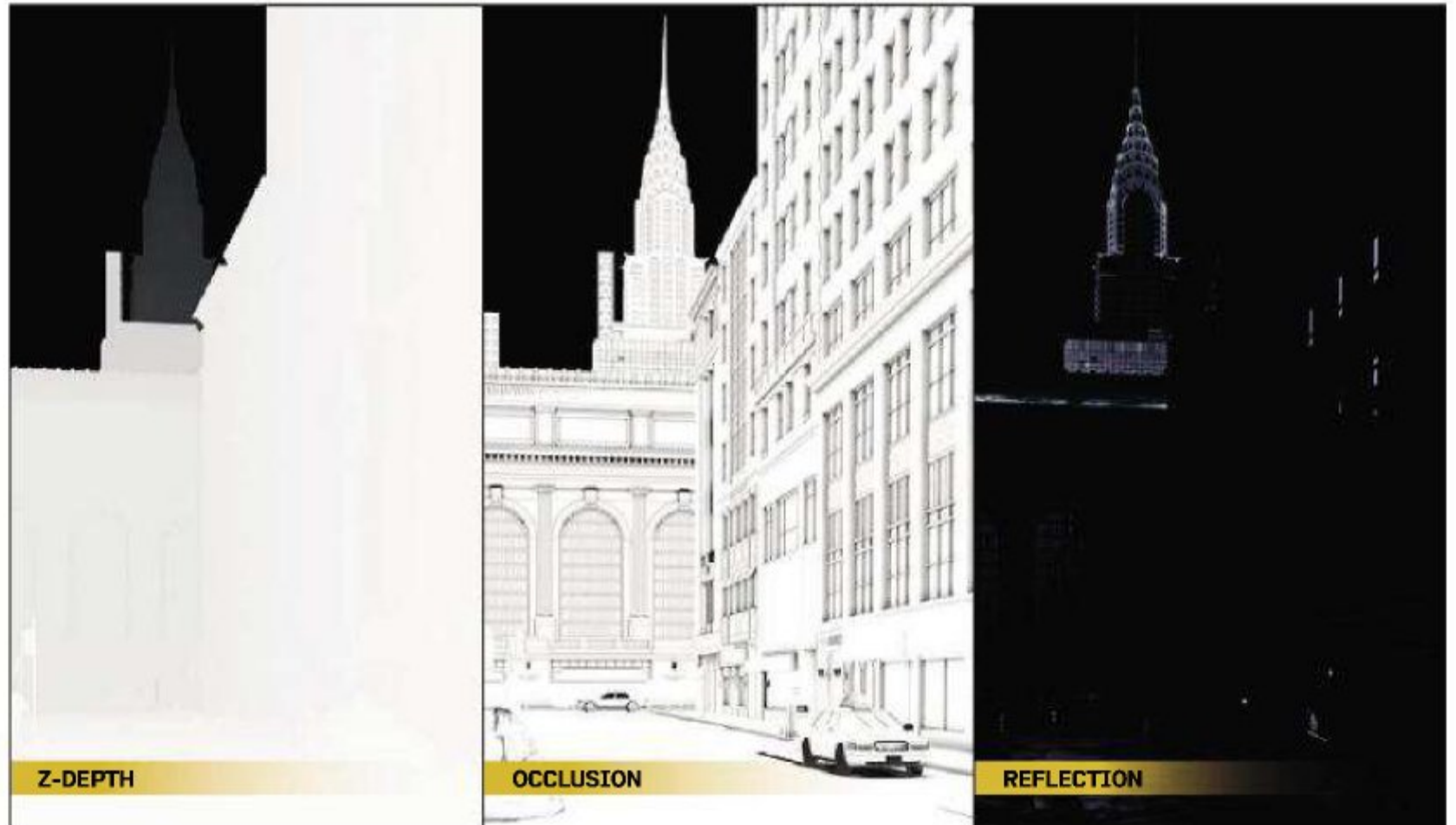
09 Multiple passes
I split the render into passes so that I could get full control of the image in post-production. The most important elements here were Z-depth, Ambient Occlusion, Reflection and the Alpha channel.

10 Post-production
All post-production was done in Photoshop. The first step was to add the sky and then I increased the contrast, changed the colour balance and added fog to the image. Finally, to complete the scene, I added some vignetting and film grain. ●

View other examples of Dennis Kaya Iversholt's work at latter.cgsociety.org/gallery
If you would like to see your work in our portfolio section, please send your images to: *portfolio@3dmag.com*

Short Cuts
The best new
animated shorts
from outside the
major studios

Rising above it all

Rediscover an old legend in Hezarfen, a playful short about one man and his quest to fly. Kerrie Hughes talks to its creators

S et in 17th century Turkey, Hezarfen is a comedic version of the legend of the first-ever flying human, Hezarfen Ahmet Çelebi. It's the work of four final-year students at acclaimed CG school Supinfocom Arles – Tolga Ari, Romain Blanchet, Chung-Yu Huang and Remy Hurlin – who adopted the roles of TD, art director, lead FX and head animator respectively.

The film opens with a tense shot as an anxious crowd look up at Hezarfen preparing to jump from the top of the 180-foot-tall Galata tower. Right at the last minute, as he leans over the edge, a panic-filled change of heart causes him to slip and his scramble to hold on sets off an hilarious chain of events. These eventually go full circle, ending up with the winged man forced to take the plunge.

The idea for the film came from technical director Ari, one of whose inspirations was 2005 Gobelins animation Le Building, which also features a domino-like effect in its storytelling. Keen to add their own twist, the team decided not to portray Hezarfen as the hero of legend. His character was designed to make him appear nervous and weak, so it's no surprise when he desists at the crucial point. "We decided that a heroic appearance wouldn't fit with our movie's tone", says Ari. "By creating him in a more human light, we thought that the audience wouldn't believe that he could fly at the beginning, and that way could be surprised at the end."

While the original story is about a flying human, in this version it's the farmyard animals that take centre stage in the air. Among the chaos, an unfortunate chicken and a herd of careless sheep have some of the funniest moments in the film. "These scenes were a big challenge in editing and animation, without mentioning the FX simulation and the cityscape [backdrop] that we couldn't hide, because we were on top of the roof," explains FX leader Huang.

Organising the workflow

Like in any professional studio, the team's members undertook the role that best reflected their personal strengths. The short is just three minutes long, but features at least nine characters that had to go through each stage of the pipeline individually. Producing a model, rig and then animating that many characters is by no means easy, so it's little surprise that they chose 3ds Max for the heavy workload. "It was our best friend during preproduction," says lead animator Hurlin. They were also fortunate to have help from a fellow student, Vincent E Souza, who offered his rigging setup as support.

VITAL STATISTICS
Title Hezarfen
Duration 3:20
Directors Tolga Ari, Romain Blanchet, Chung-Yu Huang, Remy Hurlin
Production time 12 months
Software 3ds Max, V-Ray, Photoshop, After Effects
Synopsis One man's attempt to become the first-ever flying human results in hilarious chaos that quickly spreads throughout town
If you like this, watch... Le Building, Gobelins student animation, 2005
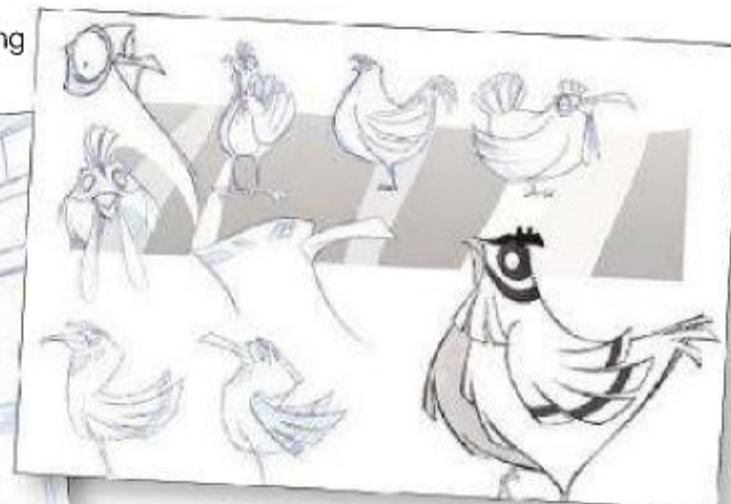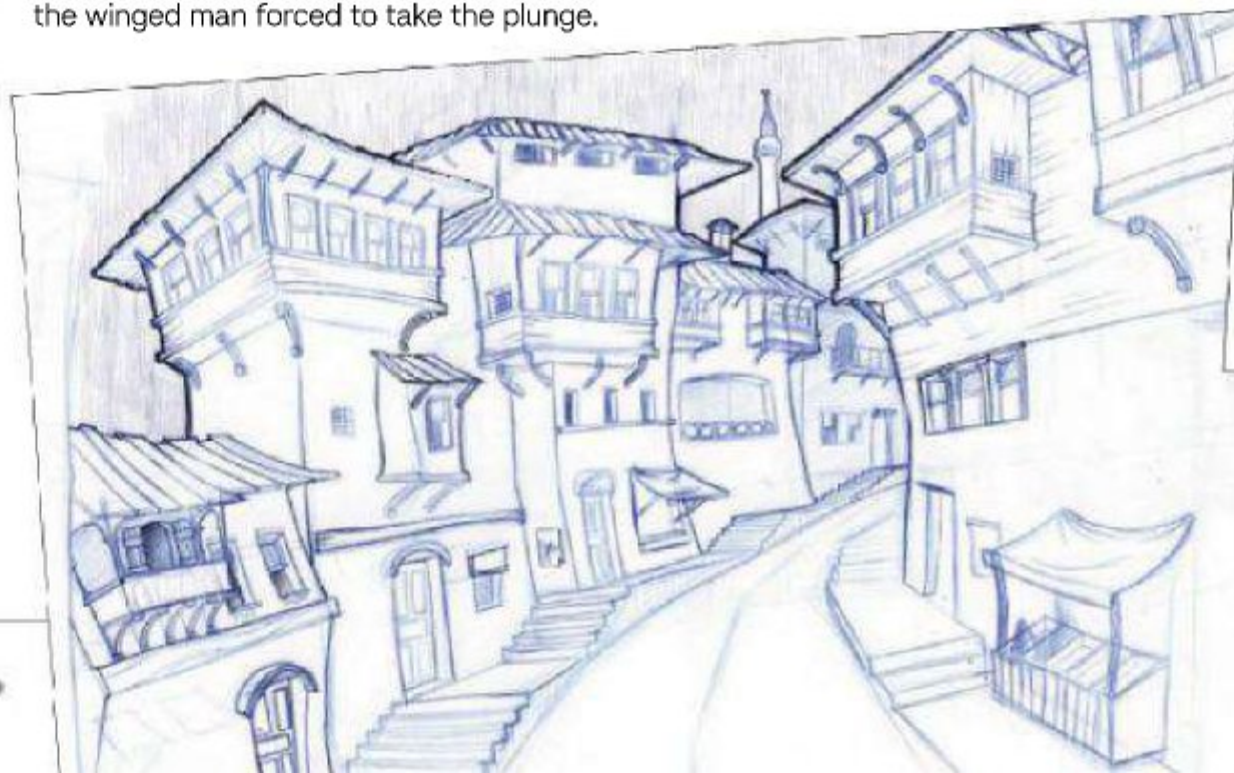
◼ Countless sketches were drawn for both the characters and environments in preproduction, with the team commenting that the easiest by far was the chicken

KEY TECHNOLOGY

The Hezarfen team took advantage of the 2010 version of 3ds Max by fully utilising the new Containers tool. Designed to help manage scene complexity, among other things, it enables the artist to put multiple objects into one group and then close it off so they aren't editable. "Rendering a full city wasn't easy – there were too many elements and it was becoming difficult to navigate it in the software, so containers were a real help," says Ari. The foursome combined this new tool with a point cache script to record animation data, helping to reduce production times.

The team carefully considered the look of the film using references such as Disney, Pixar and Dreamworks animations to create their own visual style

Although Hezarfen is a fully CG film, it's reminiscent of early Disney 2D animation in its set designs and subtle colour tones. This is just the look the team were aiming for, and to accomplish it took a lot of time. "The most important thing was to paint all the textures by hand to get the result we wanted, and spend a lot of time compositing to find the mix between 2D and 3D," says Blanchet. "This way, we found our own graphic style."

There are scenes that wouldn't be found in a Disney film, though, such as a Turkish bath where ladies are making full use of the facilities. Being the only part of the film shot indoors, it presented the foursome with new issues. "Challenges we had [included] the different render of the Hamam compared to the rest of the movie: the lighting and colour changed completely," says Hurlin. They used V-Ray renderer and some Scanline passes to achieve these images, and while they created a bigger workload, the extra effort paid off.

Hezarfen provides an action-packed three minutes, full of complex character design, professional animation and quality composition. Upon completion of the film, the team found work as 3D generalists all over the globe, with a couple securing jobs at well-known companies Double Negative and Ubisoft. Clearly a talented group, we look forward to seeing their next work. ●

The students relied on 3ds Max during preproduction: their heavy workload involved creating more than nine characters for a film of only three minutes' duration
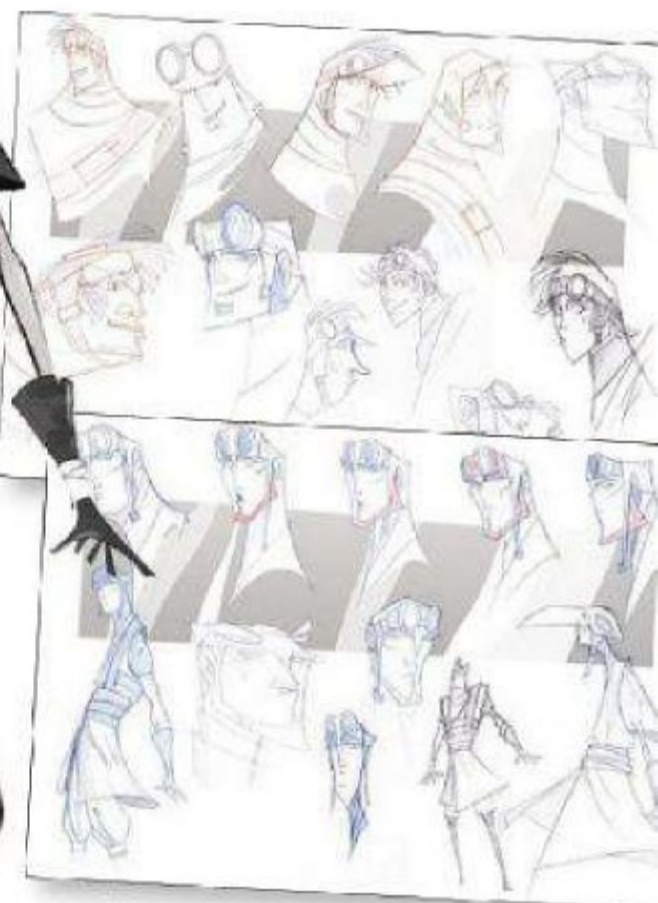
Hezarfen went through many stages of design in order to ensure that he didn't visually represent a hero-type character

WATCH THE ANIMATION
You can view Hezarfen in the Animations section of our website
tinyurl.com/shortcuts141

Send us your shorts
To submit work for inclusion in Short Cuts, contact us at the address below, attaching a brief synopsis and at least three stills
enquiries@3dworldmag.com

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Inbox

This month: calls for LightWave coverage, worries about videogame courses and the pick of your recent tweets. Send your own feedback to **inbox@3dworldmag.com**
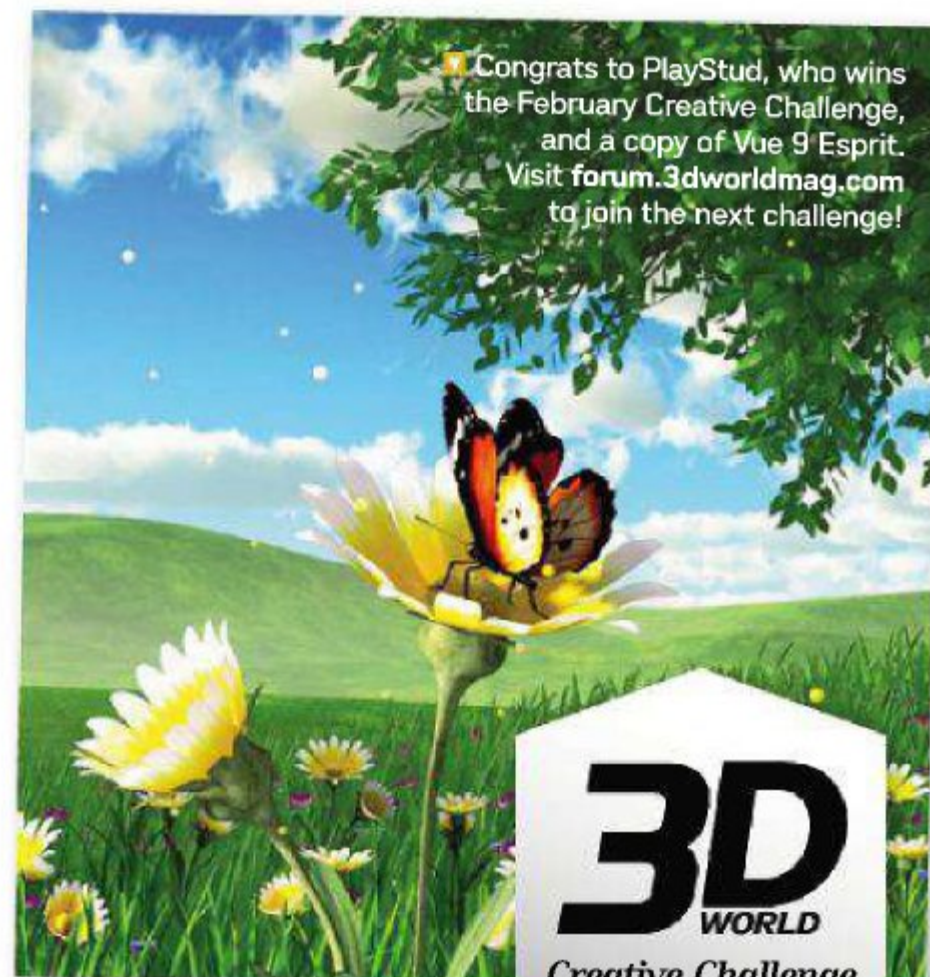
■ Congrats to PlayStud, who wins the February Creative Challenge, and a copy of Vue 9 Esprit. Visit forum.3dworldmag.com to join the next challenge!

3D WORLD
Creative Challenge
WINNER

■ Eric Bacus very often does LightWave Q&As for us, such as this one to add CG geometry to a real building. Expect more LW content in the future

SURFACE TENSION

I want to say thank you for the LightWave video on issue 138's cover disc. It's a great tutorial and it's great to see LightWave covered in the magazine and cover disc again. It seems that sometimes LightWave content is a little thin on the ground. I would love to see more LightWave content on the magazine and, of course, these video tutorials are brilliant.

It would be great to see some tutorials on surfacing. I would really like to see some attention on or tips for creating photo-real glass (refraction, transparency) and metal (reflection, specular and diffuse), and the rules required to get the look just right. Thanks again. Please keep up the good work.
Pat, via email

We have no intention of dropping coverage for LightWave, although we don't have any surfacing tutorials lined up at the moment. Of course if you have any specific questions, you'll find the forumites over at newtek.com/forums are a very knowledgeable and helpful group. Or you can post on the 3D World forum, and one of us can help you there.

IN THE ZONE

I really enjoyed your feature on Killzone 3 in issue 140 of 3D World. It was amazing how much detail the article went into. I've been thinking about making a career in the games industry, but I'm not too sure where to study.

I read the story "UK can build a 'Golden Age' for VFX and games" on your website (tinyurl.com/6ys4k3a). Now I'm worried I'll make the wrong decision and won't be able to get a job. The article said that games courses need to be accredited, but with so many out there, and so few making the grade, how will I know where to choose?
Kevin Weckerley, Hastings

While so few courses are up to standard, you need to look at the individual modules and reputations. Look out for the courses that teach a level of maths and computer science. Also, places like Escape Studios are renowned for their industry ties and their statistics for graduates that end up finding jobs. If you're still confused, talk to Skillset (skillset.org): they'll be able to fully outline what the industry itself has requested, and you can match it to an appropriate games course. ●

The making of
KILLZONE 3

KILLZONE 3
Concept Album

■ Despite studio closures and buy-outs, the videogame industry is still a great place to work – but make sure you join the right course

Letter of the month

CG PIONEER

Please have a look at my picture of a sunken island. I made it in Vue 8 Frontier (the one that I got with issue 139).
Natanijel Vasic (Age 13)

Hi Natanijel, that's a pretty cool image for a 13-year-old. Glad to see the software being put to good use!

Write in and win!

Natanijel Vasic wins a copy of Digital Art Masters 5, a sumptuous look at the work of the best in the industry
3dtotal.com
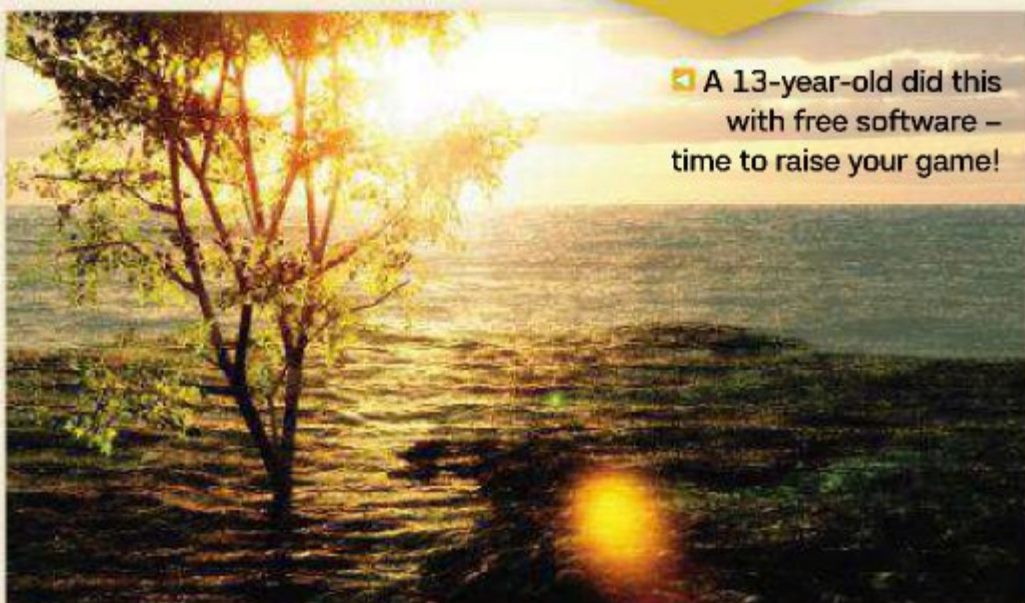
◄ A 13-year-old did this with free software – time to raise your game!

RE: TWEETS

DrillSrgtBuzz
Ivan Jose Badia
@3DWorldMag I'm reading issue 139. Just landed at D international newsstand. Loving the articles and thanks for Vue 8
3DW: No problem – thanks to e-on Software for letting us run it!

Kellisanth *Kellisanth*
@3DWorldMag - Still Q for y'all. Have you done a "3D Hardware Guide", kind of like MaximumPC's yearly "How to Build..."?
3DW: No, but interesting idea for a feature. But the killer CG rig on a budget – or no expense spared?

republicof3d *Scott Turner*
@3DWorldMag http://www.3dworldmag.com/2011/02/10/the-a-z-of-cg-cliches-part-1/ Tomorrow's clichés: gauss blur, bokey & chromatic aberration
3DW: Don't get us started on chromatic aberration. It's the effect you get from crappy digital cameras, so why in the name of Pixar would you want to replicate it in your lovely renders. Just stop it!

movingpictureTV
Mark Kelly
Will your mag have tutorials etc. regularly for this software? RT @3DWorldMag: Project Messiah offer: http://projectmessiah.com/x6/shop.html
3DW: Already on the case. (Two of us here bought it!)

Escape_Studios
Escape Studios
Andy Price of @3DWorldMag has been writing about the best animated shorts of 2010 http://bit.ly/exLtJY #animation #shortfilms
3DW: The full, wonderful article was in issue 137, back-issue fans.

dr_monkeyface
David Kirkby
@3D_Davs just read your Dr Who title sequence tutorial in @3DWorldMag. Disappointed it wasn't the slit scan from the Baker era :p
3DW: Wasn't slit-scan a long and arduous process? Sounds expensive.

pkaracas *Peter Karacas*
@3DWorldMag How about

some Cinema 4D and RealFlow tutorials?
3DW: May we refer you to issues 136 and 140?

sean_lamb *Sean Lamb*
@creativebloke
@3DWorldMag Yeeeaaaah! I could really use that magazine binder for all my 3D Worlds. Take that, bookshelf!
3DW: Careful: it's surprising how heavy 13 issues can be in one lump.

VirtualKik *Ansu*
@3DWorldMag Any plans for competitive subscription offers to NZ? Vendor pricing rather unaffordable for most, especially students
3DW: Well, you might want to take a look at our Zinio offering – just visit zinio.com/3dworld!

3D_Davs *Andy Davenport*
Yank out the phone and cut the plug off the TV: I've got a Q&A for @3DWorldMag to write! Can someone turn off the internet for a bit too? ;)
3DW: But what would our competitors do for editorial content then?

3D World forum

Go online to talk about the hottest 3D trends and share tips. There's a Creative Challenge every month for you to flex your 3D muscles on, too **forum.3dworldmag.com**

▶ New Maya plug-in IKinema rapidly generates full-body animation for a wide range of characters. The technology is also available as games middleware

▶ Simple constraints and forces can be used to generate character motion. Here, a press-up motion is created by applying force from the plane on which the figure's hands rest

Motion editing for the masses

IKinema's new plug-in enables users to create or retarget motion data inside Maya – in real time, for just $495. Is this the start of a new age of mocap?

Start-up developer IKinema has released a new plug-in enabling users to create or retarget motion data directly inside Maya, in real time, and for a fraction of the cost of alternative solutions. The IKinema technology, also available as games middleware, promises to radically simplify the rigging and motion-capture workflows of large studios and to bring real-time motion editing within the reach of home users.

IKinema for Maya costs just $495 and is available both directly from the company's website and through long-established UK training body Escape Studios. The technology is endorsed by – and promoted to clients of – Vicon, offering support for Vicon-recorded mocap data directly inside Maya; and comes with rave reviews from beta users ranging from Framestore's London studio to 20th Century Fox's pre-viz department.

Not everyone in the industry may be so happy about IKinema's debut, however. While the developer has worked closely with Autodesk on integrating its technology into Maya, and now aims to port the plug-in to both 3ds Max and Softimage, IKinema threatens to cut another of Autodesk's products out of the production pipeline entirely. But of that, more later.

A fresh perspective

IKinema CEO Alexandre Pechev freely admits that he had no prior experience of the 3D world before founding the company. An academic at the University of Surrey's Space Centre, his work centred on mechanisms for orienting satellites correctly in orbit, before he realised that his research had applications in other fields.

"When I started putting together a paper on the subject, I realised that most of the work done with this particular actuator was borrowed from robotics," he says. "I realised that there was an obvious benefit for computer animation, because quite a lot [of the technology in use] in animation has also been derived from robotics."

Having demoed his early work at GDC Europe in Cologne in 2009, Pechev founded IKinema early in 2010. In addition to its Surrey office, the company now employs three full-time developers and several part-time staff in Pechev's native Bulgaria. Although early development focused on middleware technology, work began on the Maya plug-in in April 2010, and the software was released in November.

One of IKinema's main attractions is the speed of set-up. Users simply import a mesh, create some bones and start work. Individual body parts can be manipulated directly or parented to guide objects, with IKinema calculating the movement of the rest of the character.

Not that IKinema is confined to characters. As Pechev puts it: "That's the whole beauty: there's no characterisation [step in set-up]. All that matters is that the rig has a hierarchy." Demos on the IKinema website show the plug-in being used to animate bipeds, quadrupeds, scorpions, octopi and even less conventional 'actors' such as trees.

The plug-in includes basic balance and force constraints, meaning a character can be made

◀ The system features a full range of standard retargeting functions, enabling motions to be transferred to characters of different proportions, edited, blended or retimed
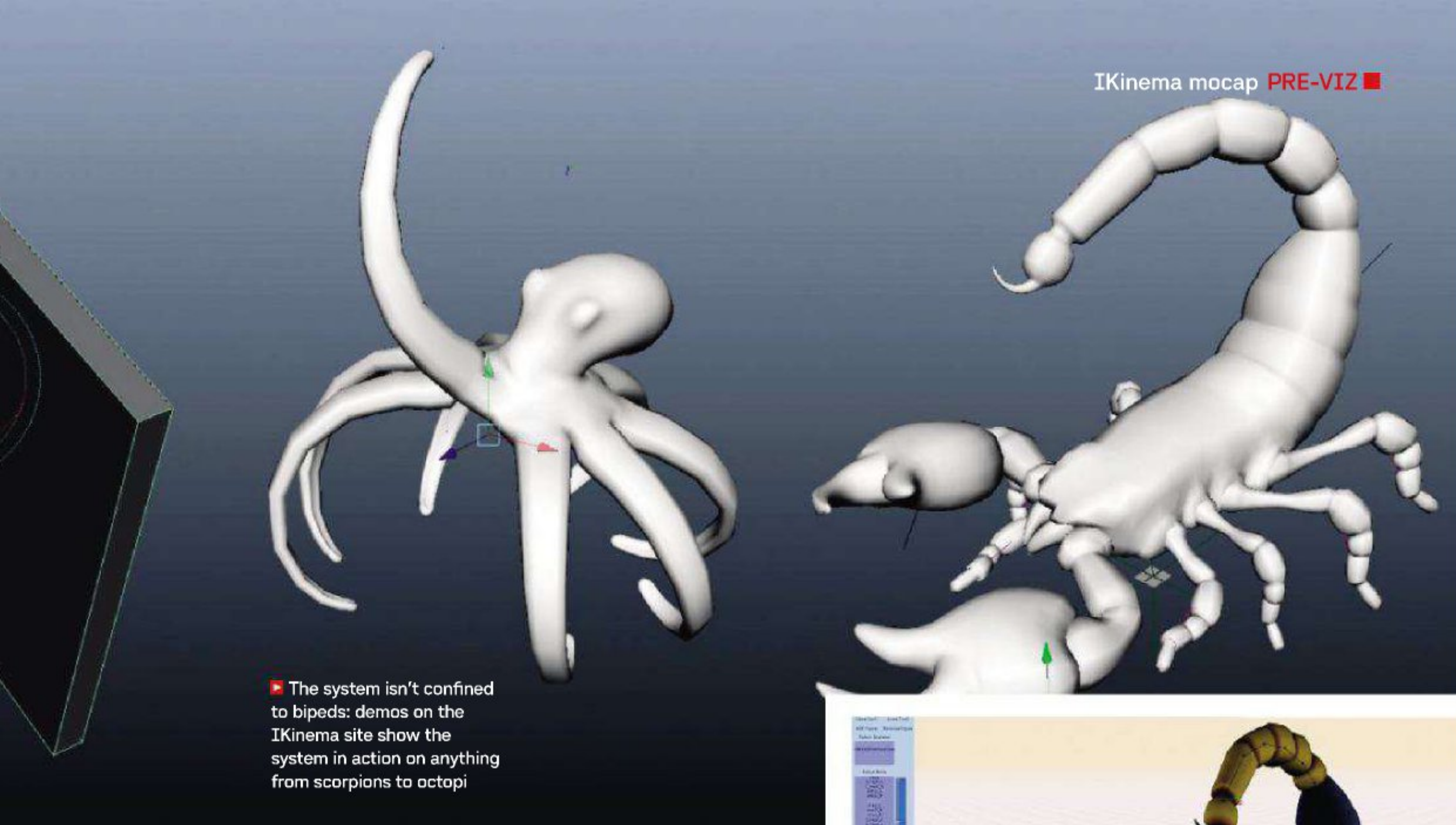
▶ The system isn't confined to bipeds: demos on the IKinema site show the system in action on anything from scorpions to octopi

to balance automatically on its feet, hands, paws, tentacles or other available body parts; or to interact with surrounding objects.

It also includes a range of standard retargeting functionality, meaning that motion-capture data can be applied to characters with different bodily proportions to that of the capture actor – one particularly eye-catching demo shows the motion of a gymnast being retargeted to a horse – or retimed, blended or otherwise edited. It all sounds suspiciously like what most people would do in MotionBuilder.

"We try not to say that," laughs Pechev. "But a lot of the feedback we get from clients at the minute is, 'Oh, I don't actually need MotionBuilder now.'"

Framestore London has been trialling beta licences of IKinema in its rigging and mocap departments for several months now, with a

■ IKinema happily copes with a wide range of human and creature types, whether that be multi-limbed arachnids or tentacled cephalopods

the actual character. "The idea is to allow the animators, who are ultimately the end users of the data, to open up Maya scenes containing a live IKinema bind and tune the solve for themselves in an environment they're comfortable in," says Marshall. "Once happy, they can bake this down to their skeleton then bolt on a standard IK articulation rig to refine the motion further."

The benefit is doubled in games work, since IKinema removes the need for characterisation inside the games engine as well as the 3D
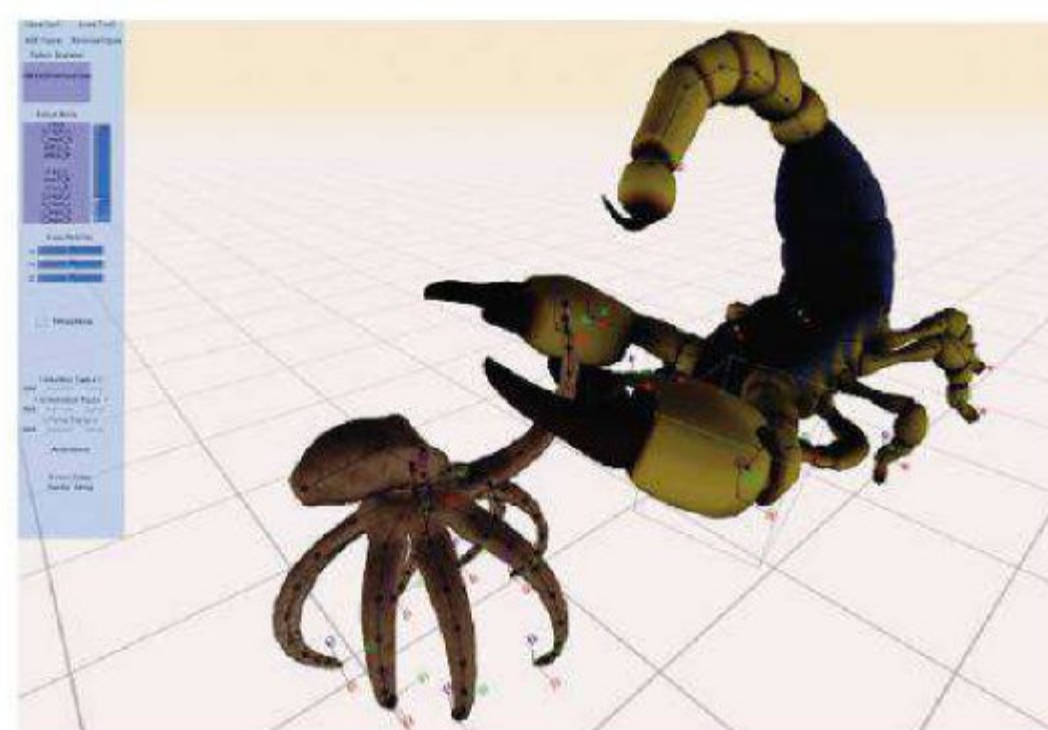
"The beauty of IKinema is that you create a rig, put in a mesh and you're done. There's no characterisation. All that matters is that the rig has a hierarchy"
Alexandre Pechev, founder, IKinema

view to eliminating MotionBuilder – and the time-consuming extra data-conversion step it introduces – from its pipeline. (See 'User feedback' on page 28.)

"Traditionally, [retargeting] would have happened in MotionBuilder, with the end result being an exported FBX animation," says Gary Marshall, the company's senior motion-capture TD. "But with IKinema, we saw the opportunity to bypass that step and bring the data straight from mocap source to Maya.

From Framestore's point of view, a key benefit is that all of the work can be done directly on

software. Reportedly, the quality of the motion generated is more natural and organic-looking than many competing solutions. "It means you can get to a final result much quicker, without needing to do much tweaking," says Pechev.

Playing with games

The system's footprint is also small: in the middleware version, IKinema runs on one of the PlayStation 3's six SPU processors, and can put three solvers on it. In contrast, some rival technologies occupy more than a full SPU. In addition to Sony's PhyreEngine, IKinema
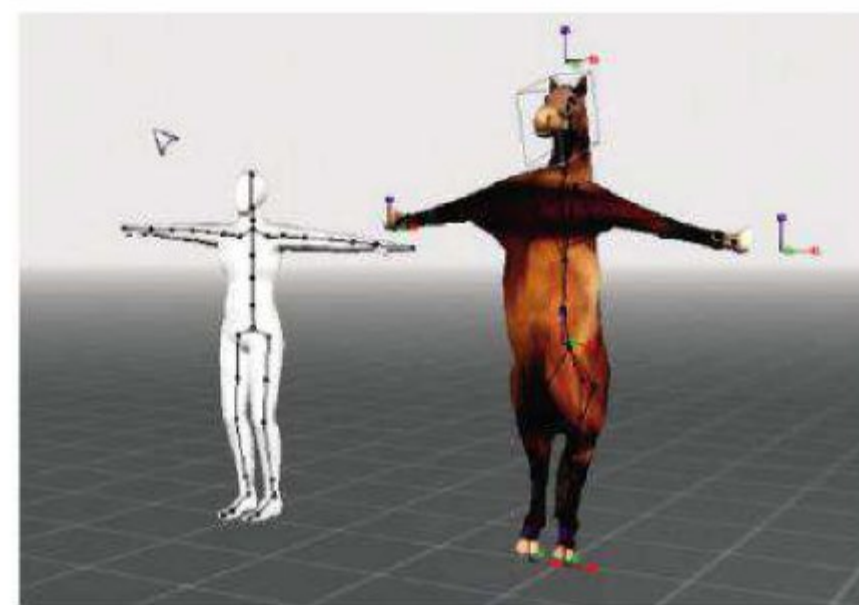
■ IKinema allows motion data to be retargeted between actors of radically different proportions. Here, a gymnast's motion is retargeted to a horse

is available as a plug-in for the Trinigy Vision engine used by Ubisoft and Firefly Studios, with others being added on request. One of the few major engines that proves a problem is Unity: IKinema is written in C and C++ rather than the C# that Unity's toolchain currently requires.

The IKinema middleware neatly slots around a game's physics engine. "If you have a character driven by keyframe animation, then switch to physics because he has to fall, the physics engine »
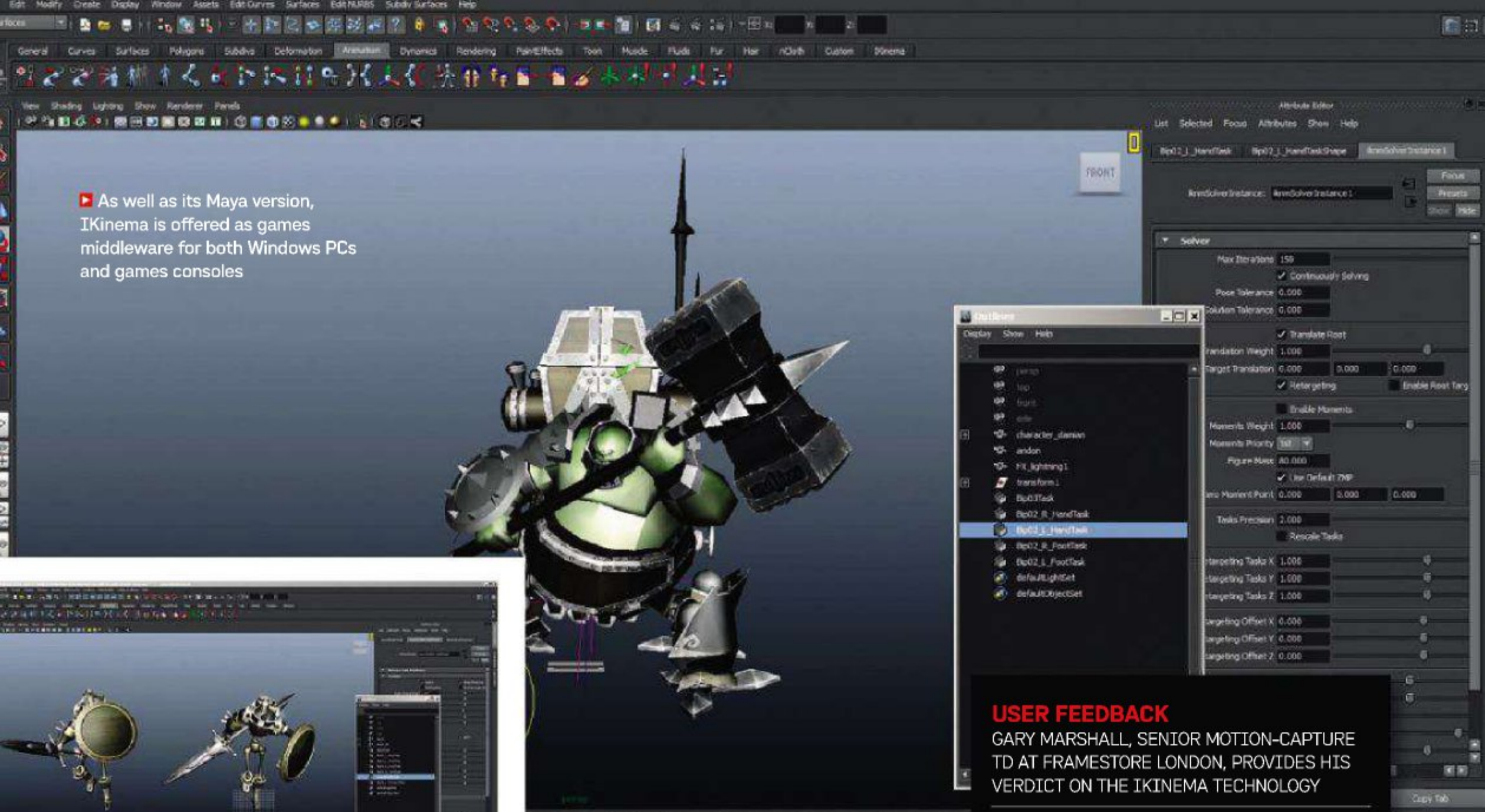
▶ As well as its Maya version, IKinema is offered as games middleware for both Windows PCs and games consoles

🔺 IKinema can tie in with game engines so that physics information can readily be passed to the IKinema solver as retargeting data

can calculate the underlying forces, then pass the information to IKinema as retargeting information," says Pechev. "It could be full body, lower body or upper body. On top of that, you can add IKinema handles, so the character could grab a branch as he's falling. It gives you direct control over your physics output."

In many respects, it's amazing just how far IKinema has come in such a short space of time.

"The ability to capture data using low-cost sensors is very interesting. I'd like to use the Kinect for very basic motion capture directly inside Maya"
Alexandre Pechev, founder, IKinema

In little more than a year, the company has released both a commercial middleware solution and a Maya plug-in; formed official partnerships with mocap vendors Vicon and Xsens; and has its technology in evaluation at studios ranging from Framestore to DreamWorks.

Yet the pace of development hasn't slowed: if anything, it seems to be increasing. Pechev describes his immediate focus for the plug-in as new functionality, including support for other new capture systems; and partnerships with game developers to customise the middleware.

Beyond that, he plans to launch a web-based service enabling clients to retarget or edit motion data on a micropayment basis. "It's like a baby version of the Maya plug-in," he says. "You

import your model and mocap data, edit and export it, all using standard formats like FBX."

He also has an eye on unconventional sources of motion-capture data, such as Microsoft's new Kinect peripheral. "The ability to capture motion using low-cost sensors is very interesting," he says. "If Microsoft opens the Kinect platform to the PC market, I'd like to use it for basic motion capture directly inside Maya."

Foundation for the future

In the long term, Pechev aims to introduce support for dynamic motion synthesis, of the sort provided by NaturalMotion's technology, into IKinema. "At the minute, IKinema has constraints and forces acting on the constraints, and works out how the body will satisfy those constraints,"

🔺 More exotic functions of the IKinema system include simple balance constraints. These aren't limited to the character's feet, as this example shows to great effect

USER FEEDBACK
GARY MARSHALL, SENIOR MOTION-CAPTURE TD AT FRAMESTORE LONDON, PROVIDES HIS VERDICT ON THE IKINEMA TECHNOLOGY

"Framestore obtained a beta plug-in of IKinema in autumn 2010 for testing in two departments. Rigging saw potential in its ability to quickly solve complex hierarchies that didn't conform to standard bipedal/quadrupedal topology, while motion capture was interested in assessing its retargeting.

"We're now starting to integrate the plug-in as a core part of our motion-capture pipeline, taking tracked and filtered point cloud data from our mocap software in C3D format, solving that to an intermediate, scalable FK skeleton in Maya, then retargeting to our character rigs with IKinema. Traditionally, this process would happen in MotionBuilder, but with IKinema we saw the opportunity to bring the data straight into Maya. Animators can now open up Maya scenes containing a live IKinema bind and tune the solve for themselves. This has been employed in production for both broadcast and VFX projects.

"IKinema has performed well for us in production. It enables us to get the data into Maya that much quicker. The workflow is intuitive and the resulting solve is believable. The ability to solve unconventional hierarchies also gives riggers the chance to rapidly prototype and pose test characters.

"The ability to record multiple takes during real-time streaming would be great. A more visual retargeting and mapping workflow, such as dragging bones onto a graphic, would also be beneficial, as would the ability to save out pre-defined mapping templates."

he says. "When you move them in a dynamic way, it has the look and feel of dynamic motion synthesis, but it doesn't take mass [or inertia] into account." ●

IKinema is available for Maya 2009 or later on Windows, Mac OS X and Linux for $495. A middleware studio licence costs $15,000 for Windows and $30,000 for consoles
ikinema.com

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in record time
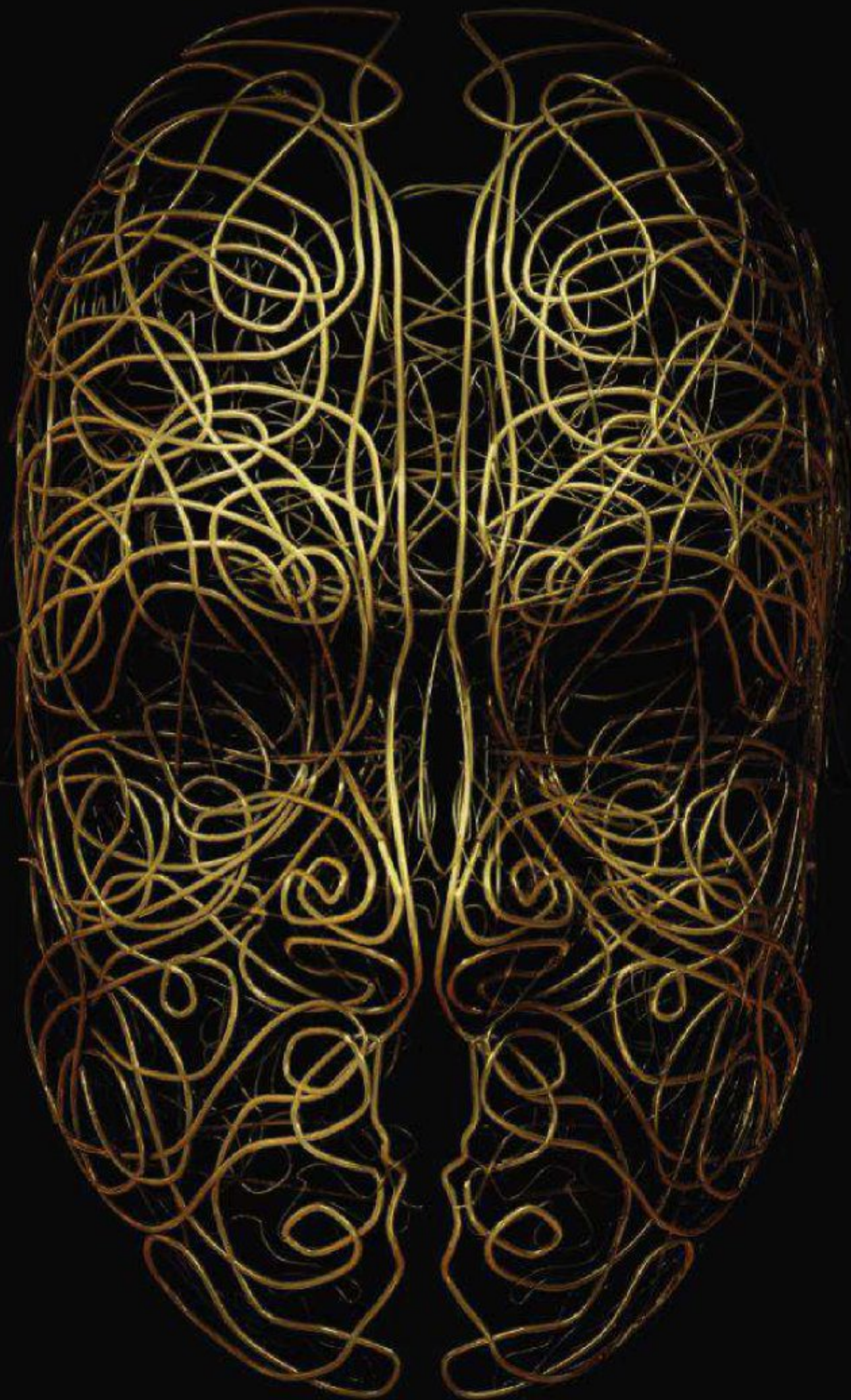
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software

The Filter

Our pick of the past month's 3D software and training resources, ruthlessly stripped of PR hyperbole. Visit **3dworldmag.com** for more

Introduction to Maya Fur

PUBLISHER: Digital-Tutors
This 18-lesson tutorial provides detailed training for beginners and artists familiar with the Maya Fur toolset. Starting at the beginning, it walks through exactly how to access these tools through the plug-in manager and goes on to explore each attribute of the fur description node with simple but effective examples of how to manipulate each one. It goes on to cover rendering with light modes for specific effects, applying fur on multiple objects and the use of texture maps to gain complete control over the final look. At less than two hours, this training offers a convenient route to all the information needed to work on individual fur projects.
PRICE: Via subscription (from $45 a month)
MORE ONLINE: digitaltutors.com

FreeForm Pro

DEVELOPER: Mettle
WHAT IS IT? A plug-in that provides 3D mesh warping in After Effects
MAIN FEATURES
- Powered by the 3DNAE rendering engine
- Includes new 3D displacement mapping and other new algorithms
- Features a built-in instance generator, for increased creative possibilities
- Exposed control points for use with expressions and tracking data

THEY SAY: "FreeForm Pro renders up to times faster than the CS5-bundled version, is even easier to use and goes way beyond 3D mesh warping"
WE SAY: With its new instancing system and a GPU speed-up, this update looks like it could be a great addition to the motion graphics artists' toolset, and a nice alternative to the Trapcode hegemony
PRICE: $299
MORE ONLINE: **mettle.com**

Ozone 5

DEVELOPER: e-on software
WHAT IS IT? New version of the plug-in that creates realistic atmospheres for 3ds Max, Maya, Softimage, Cinema 4D and LightWave
WHAT'S NEW?
- Spectral 3 technology enables accurately simulated environments that affect scenes in a natural way
- Compatible with V-Ray sun and sky technologies
- Library with over 150 predefined atmospheres
- Fast render times

THEY SAY: "With its easy-to-use interface and wide range of features, Ozone 5 is the essential tool for animators and still creators seeking professional atmospheric results"
WE SAY: We were big fans of Ozone 4, and now it's faster, more realistic and plays nicely with V-Ray. We just wish the presets would get an update too
PRICE: $295; upgrade from Ozone 4, $95
MORE ONLINE: tinyurl.com/4qmwpxr

3DSOM Pro 3

DEVELOPER: Creative Dimension
WHAT IS IT? Updated image-based modelling app
WHAT'S NEW?
- New pin marker points mean a calibration mat is no longer required
- 3D modelling tools for interactive mesh editing
- Quick texture preview for viewing model prior to building final texture map

THEY SAY: "A much enhanced toolset allows users to build a wide range of objects, including concave objects such as vases and bowls, as well as organic and complex objects that are traditionally hard to model"
WE SAY: The new approach to modelling with pin markers should extend 3DSOM's usefulness beyond small-scale objects by making large items much easier to work with
PRICE: $1,499
MORE ONLINE: **3dsom.com**
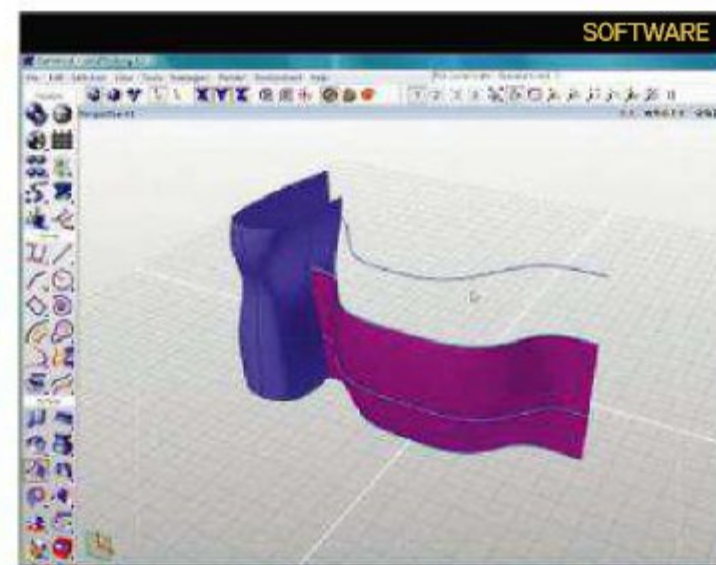
solidThinking 8.5

DEVELOPER: solidThinking
WHAT IS IT? Upgrade to the NURBS-based 3D modelling and rendering environment, with extended Inspired version also available
WHAT'S NEW?
- Improved 3D modelling toolset
- Enhanced render options, including real-time photorealistic rendering
- Morphogenesis technology in solidThinking Inspired enables the creation of natural shapes

THEY SAY: "The fundamental functions behind design are ideation and iteration – the ability to conceptualise ideas at the speed of thought and without constraints. solidThinking 8.5 is our next step in redefining the way design concepts are created"
WE SAY: Version 8.5 provides over 900 new features and tools that will keep competitors on their toes
PRICE: On application
MORE ONLINE: tinyurl.com/4npnau5

SOFTWARE
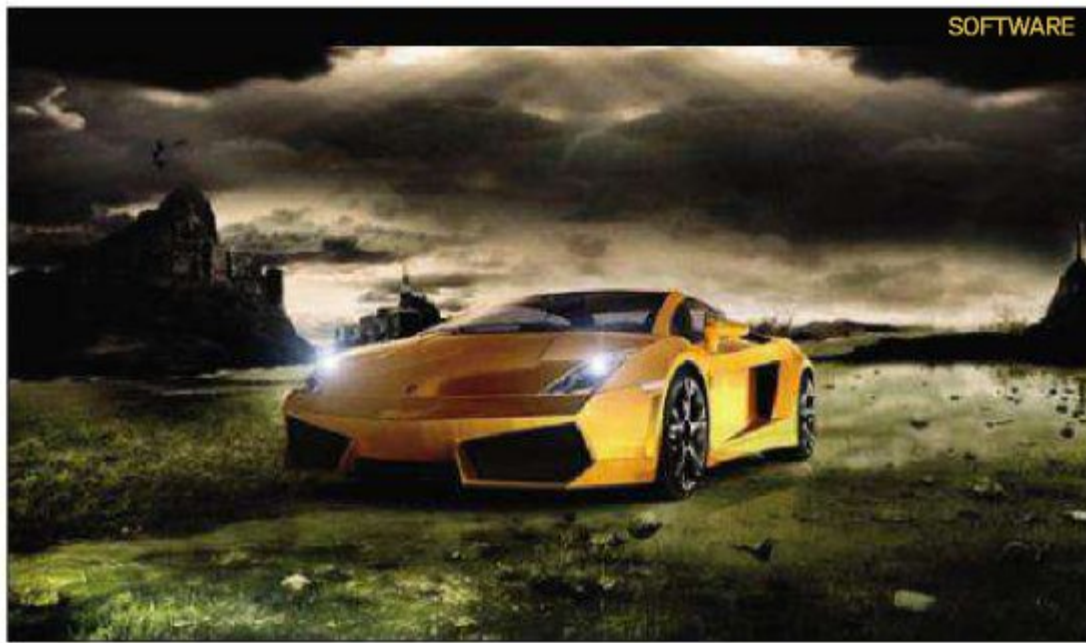
Keyshot 2.2

DEVELOPER: Luxion

WHAT IS IT? An update to the interactive raytracing and global illumination program that creates photographic images from 3D models

WHAT'S NEW?

- Improved real-time interaction with objects
- Supports 3Dconnexion 3D controllers
- Enhanced import pipeline
- Render times up to 15 times faster when dealing with complex materials and settings

THEY SAY: "KeyShot 2.2 is all about workflow improvements. The improvements to the importers and the overall import pipeline make the interoperability between KeyShot and CAD systems even more seamless, resulting in even faster creation of amazing images from 3D data"

WE SAY: A simple-to-use but fast and effective renderer. With this new version supporting many additional file formats and languages, the software is now more pipeline-friendly than ever

PRICE: $995

MORE ONLINE: tinyurl.com/4rc2fp3

SOFTWARE
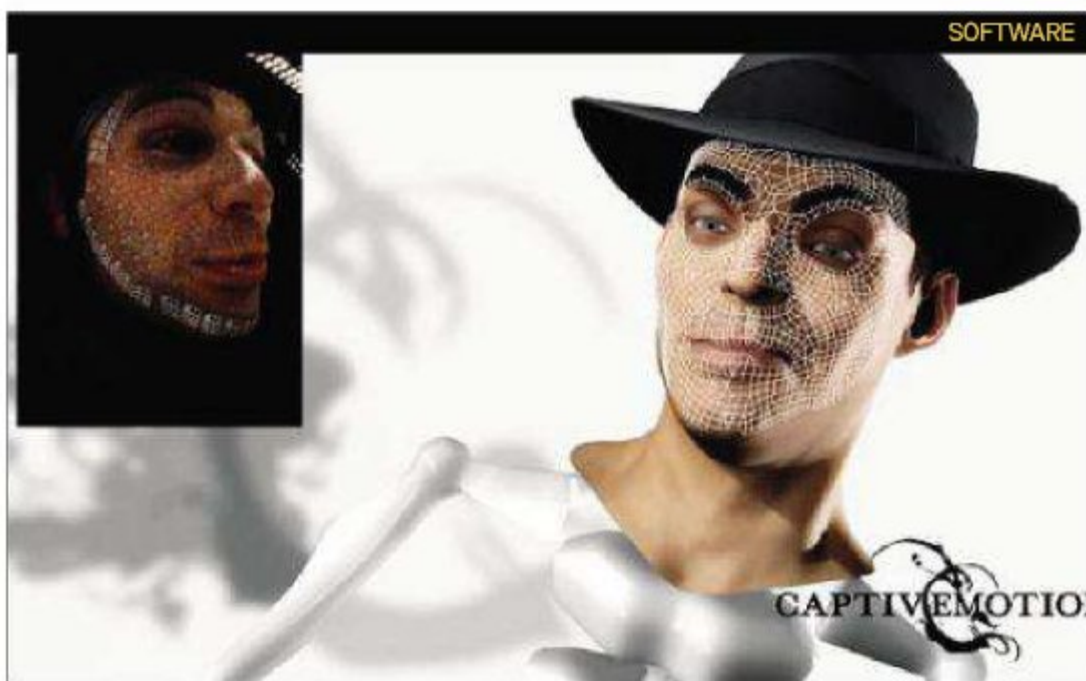
Embody Animation

DEVELOPER: CaptiveMotion

WHAT IS IT? Plug-in suite for 3ds Max that provides facial motion capture technology within the host package

MAIN FEATURES:

- Mocap-to-mesh retargeting produces animation of a character's face
- Mocap-to-rig retargeting produces bone animation of a character's face
- Advanced skinning tool
- Features exposed to scripting for easier pipeline integration

THEY SAY: "Embody makes it easy to produce extremely high quantities of facial animation while still providing exceptional detail, and it is possible to go from a mocap session to finished animation in under five days"

WE SAY: The demos of this software look really cool, mainly because its advanced technology means it is has amazing mocap capabilities. The 3ds Max plug-in is due in March, with the Maya plug-in planned for later in 2011

PRICE: On application

MORE ONLINE: captivemotion.com
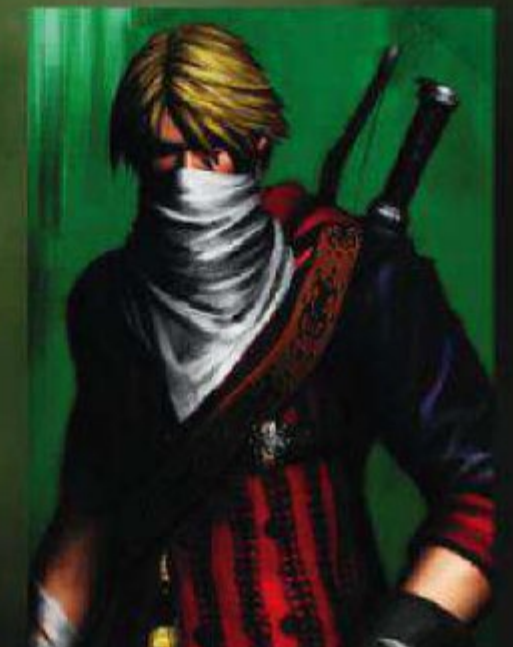
Part 4 Socket to 'em

Dual socket technology can put a supercomputer on your desk

When you're rendering 3D, crunching huge datasets or creating complex models, there's no such thing as too much power: the more powerful your workstation, the happier your working day becomes. That's why Dell created the Precision T5500 and T7500 workstations, everyday supercomputers that deliver the multi-core processing punch and sheer scalability you've been waiting for.

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With support for not one but two next-generation, multi-core processors, the Dell Precision T5500 and T7500 can deliver up to twelve cores of processing power for your most demanding applications. Factor in RAID storage options, dual-native PCIe x16 Gen 2 graphics slots and in the Precision T7500, enough room for an enormous 192GB of DDR3 RAM and you've got something truly astonishing.

Faster, more powerful and more efficient than ever before, the Dell Precision T5500 was voted Best Workstation in the influential industry publication InfoWorld's 2011 Technology of the Year Awards. "Demanding users who need the expansive capacity and roaring muscle of a high-end desktop should look no further," said InfoWorld in its report.

Core strength

Inside every Dell Precision T5500 and T7500 there's an incredibly powerful heart: the latest-generation 32nm Intel® Xeon™ 5600 series processor. Designed specifically for content creation, visualisation and simulation, the 5600 series offers stunning performance and impressive efficiency: in tests, Intel demonstrated a 38% improvement in performance for digital content creation and advanced workflow modelling. Intel® Quick Path technology provides high-speed interconnects between each processor core, an integrated memory controller with dedicated three-channel high-speed memory architecture and multi-level shared cache for blistering performance.

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At Dell we know that no two pros are alike, and that's why we've developed a chassis that's flexible enough to suit any environment: with over 1 billion possible combinations the Dell Precision T7500 can be configured for the most demanding

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Dell Precision Workstations are designed to work as hard as you do. We work closely with leading Independent Software Vendors (ISVs) to deliver unrivalled performance and reliability in the most demanding environments, and our Dell Precision workstations are built specifically for the most demanding jobs in engineering, product design, animation and digital imaging. With the latest technology in our scalable servers and storage solutions, Dell is the one-source partner to match your IT ambitions.

ILM rides into town

The venerable visual effects shop Industrial Light & Magic has taken a bold step into feature-length animation with Rango, a CG western from director Gore Verbinski and production designer Crash McCreery. **Barbara Robertson** goes behind the scenes

H old onto yer hats, boys. Gore Verbinski, Crash McCreery and a gang of VFX cowboys from Industrial Light & Magic have stampeded into 'toon town. Rango, the CG spaghetti western they lassoed, has hit the screens.

Produced by Blind Wink, GK Films and Nickelodeon Movies, and distributed by Paramount Pictures, Rango is the first animated feature for Verbinski, the director who spun an amusement park ride into three Pirates of the Caribbean box office hits. It's also the first animated film for production designer McCreery, a visual effects concept artist and creature designer known for Terminator 2, Jurassic Park, Pirates and other blockbusters, and the first for the artists at ILM, a studio famous for 35 years of award-winning visual effects. "We thought maybe not knowing how you're supposed to do things might be a good thing," says animation supervisor Hal Hickel.

Other than the fact that the stars are animals – although almost none act like one – Rango is a traditional western, albeit one with a tongue-in-cheek attitude. One of the animal characters, for example, is a porcupine named Mr Snuggles.

The story goes like this: a city slicker named Rango becomes lost in the desert and meets Beans, a beautiful, feisty woman. He follows her into town, defeats a villainous hawk and becomes the sheriff. Then he uncovers an insidious plot hatched by a tortoise and saves the town.

Rango (Johnny Depp) is a chameleon. Beans (Isla Fisher) is a lizard. The town is Dirt, a drought-stricken, ramshackle place in the desert, inhabited by dusty, thirsty citizens. Before he landed in the desert, Rango was a terrarium chameleon riding in a car. The terrarium bounced out and Rango with it. In the terrarium, he'd played many roles, entertaining himself by telling stories to his only companion, a wind-up goldfish. So when Rango ambles into Dirt's local saloon, a grungy place filled with nasty-looking critters, he quickly reinvents himself as a hero. »

◀ ILM's first animated
feature benefits from
the VFX shop's world-
famous pedigree

Vital statistics

Total shots in film: 1,547
Total shots featuring Rango: 1,068
Total animation shots: 1,528
Animation man-hours: 79,724
Rate of animation: Two weeks for
five seconds
Longest shot: 1,505 frames
Shots per night: 350 at peak
Render time: 120 million hours
(13,670 years)
Render farm: Total processors 5,500,
plus approx 3,000 high-end desktop
systems used as needed (generally at
night). Rango was one of up to eight
large shows going through the facility
over the course of its production.
Average time per shot: 12 hours to
complete and render all the elements
in one frame
Storage: 371TB during peak
production, although the entire show
was never online at one time

▶ The scale of Rango's eyes posed challenges for animators trying to solicit a strong facial performance

"Nasty was a good word on this film," says Tim Alexander, who took the visual effects reins from John Knoll during production. As with most animated feature productions, visual effects on Rango included everything except animation.

Alexander moved onto the film after completing work as a visual effects supervisor on Harry Potter and the Half-Blood Prince, which had a relatively small crew compared to Rango, and a smidgeon of shots – albeit challenging ones: it was his crew who had to split the wall of fire for Dumbledore. Prior to

on all three Pirates films, Star Wars Episodes I, II and III and other projects tracing back into the 90s, supervised the work on Rango. "We started to build Priscilla as soon as we had [Crash McCreery's] artwork," says Campbell. "At first, we had so many questions. We weren't matching live action, so we didn't know the rules. But it quickly became clear that we were to match the artwork, not actual animals."

As they would for a live-action film, the modellers started by sculpting the characters in Maya, then moving the models into ILM's Zeno software to

> 66 We have a deep bag of tricks. For water, we used particle level set, smoothed-particle hydrodynamics and 2.5D systems. If we'd had one engine, we'd have struggled to get it to work on non-optimal cases 99
> Raul Essig, CG supervisor for effects, ILM

Potter, Alexander was visual effects supervisor for The Spiderwick Chronicles, which had its own set of weird animals. "I took everything I learned from Harry Potter and Spiderwick and applied it to Rango," he says. "We had 1,000 assets with 130 unique characters, plus 48 more based on those."

Model citizens
The first character the modellers built was one of the townspeople called Priscilla, a little girl with big eyes who looks something like a rat found in Madagascar. Geoff Campbell, who was the model supervisor

create shapes for facial animation. It soon became obvious, though, that they had a problem: the three weeks they'd scheduled for modelling each character was too short, but the schedule couldn't change.

"Gore wanted to see work in progress, and iterations were eating up the time," says Campbell. "Crash does a beautiful job with illustrations, but it became clear that we were missing maquettes."

Rather than having someone sculpt maquettes from clay, they decided to do digital ones using ZBrush. "We gave ourselves three days to do a maquette with textures," says Campbell. Once

modelled, they put the digital maquettes on turntables for approvals.

"These characters were placeholders," says Campbell. "They weren't rigged, and there was some confusion in the beginning when people asked to see them move. But everyone could see if we were on target with proportions and quality. We could then take the rest of the time to work out the details."

Roughly 12 modellers worked on the characters and other assets; some long-time hands at ILM, others hired straight out of school. They shared assets when they could – the characters' hands, for example, most of which had three fingers and a thumb. "You could borrow meshes, cut and re-establish them again," says Campbell. "There was lots

ANIMATING RANGO

Meet the man behind the chameleon

Kevin Martel began working at ILM as a character animator on Star Wars: Episode I. Later, he was part of animation supervisor Hal Hickel's crew on the Pirates films. When Hickel became animation supervisor for Rango, he asked Martel to be the lead animator for the title character. By the end of the film, Martel was associate animation supervisor.

"There's a line in the film: 'acting is reacting'," Martel says. "That was one of the first shots I did. It drilled home that message to me, to think about the broad context, not the main accents."

The broad context began when Hickel, Martel and other animators received shots from director Gore Verbinski, who walked through each sequence with them. "Gore is a fantastic actor," says Martel. "He'd perform on camera for us, and in person. He could morph from one character to another."

Martel also received the storyboards and video of Johnny Depp performing Rango. "The storyboards capture the essence of the shot," says Martel. "Johnny Depp gave us the physical performance and the eyes. I'd watch him and develop an impression in my head. I'd start to visualise Johnny Depp as Rango. That was the code in my head."

In addition, the animators had access to a room with cameras set up so they could act out the scenes. "We could close the door and let loose," says Martel. With all this material in mind, before he touched the keyboard Martel would spend a half-day or so studying and thinking, sometimes sketching. When he moved onto the computer, Martel started creating Rango's performance by placing a low-resolution model of the chameleon in poses. "I want speed to get in all those ideas," he says. "I'd block in the biggest poses. I want clarity in the poses, the main beats."

Once approved, Martel would move to a higher-resolution model to fine-tune the performance and add facial expressions. "That was the most fun," he says. "Rango has a lot of range. His eyeball is small, but he has all these folds and wrinkles, all driven by sculpted shapes. We had more than 300 controls on his face."

of borrowing of parts. Boots. Vests. Pants. Neckscarf. We entered any costume parts we'd built into a wardrobe model database."

After the maquette stage, the modellers worked back and forth between Maya to rough out models, Zeno for final sculpting, ILM's proprietary program Fez within Zeno for facial expressions, and ZBrush for displacement. Zeno was the hub.

"The modellers hand-sculpt the facial expressions and then package them in Fez, a program based on FACS [Facial Acting Coding System]," says Campbell. "The system puts in place all the expressions you can pull with your facial movements and categorises them. It also takes care of clean-up between shapes. »

■ Rango's varied cast, including this feathered Mariachi band, provided a number of technical hurdles in terms of clothing and skin types

■ Creature lead James Tooley (above) and animation supervisor Hal Hickel (right) at work on Rango

■ The making of Rango
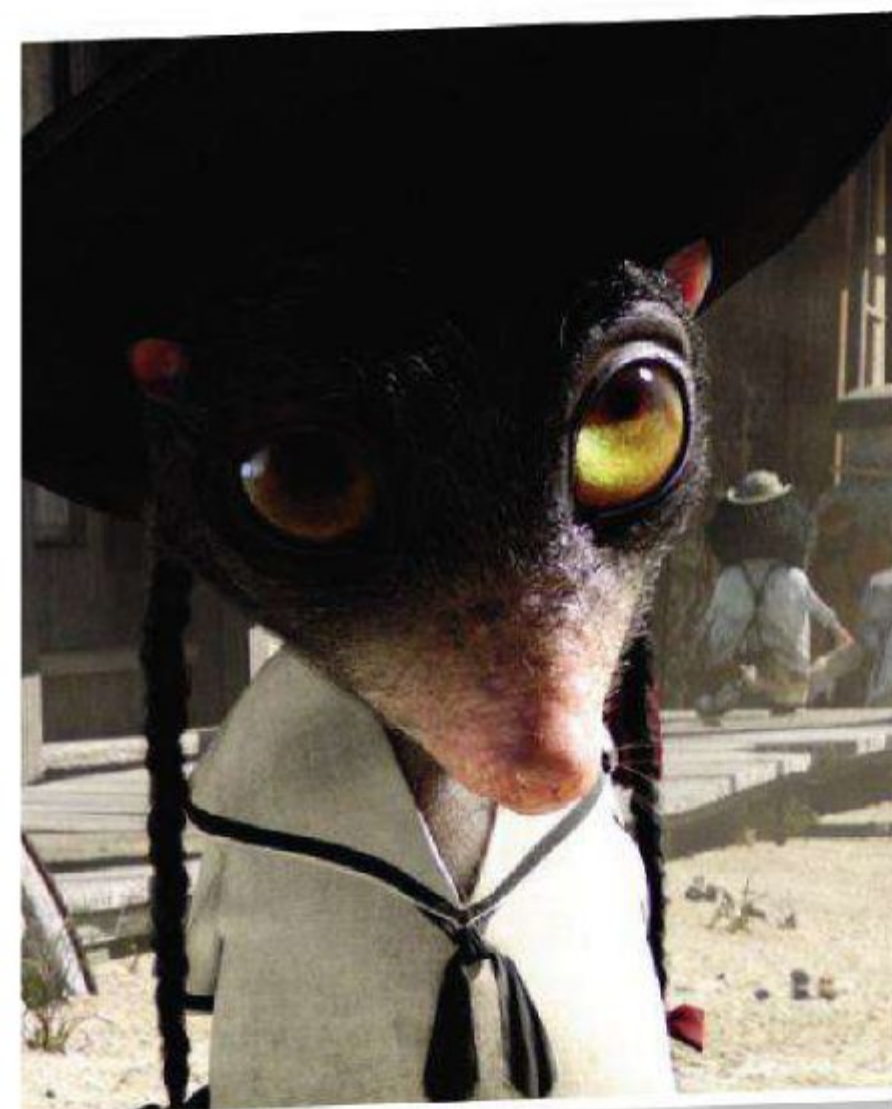
■ Priscilla was the first character the modellers worked on. "At first we had so many questions," says model supervisor Geoff Campbell

■ Bad Bill (centre of shot) is one of Dirt's low-life locals that newcomer Rango has to deal with

On Davy Jones [for Pirates], we had hundreds of shapes and it would be hard for an animator to figure out what was new. This system has fewer shapes, and it's easier to work with and modify."

For the eponymous hero, McCreery would often come to ILM to work with the modellers. "Things changed sculpturally all the time," says Campbell. "It had a lot to do with the size of his eyes. We had a lot of back and forth about how they'd move, how he could handle a facial performance. He has tiny eyes that aren't like human eyes. The eyeball is covered in skin. And Gore really stressed – with all the characters – that he didn't want any symmetry. No animated character look. So one eye is slightly offset from the other."

Directing the ensemble

Unlike most directors of animated films, Verbinski recorded the dialogue with the ensemble cast, rather than having each actor work individually in a sound booth. "He wanted the freshness," says Hickel, "and it gave him the opportunity to block out scenes."

The actors wore costumes and worked in sets on sound stages. Neither the costumes nor the sets were elaborate, but they were enough to provide atmosphere. "We also had a sound area curtained off so the actors could repeat their lines, but even

" For the desert, we emphasised that everything is brittle. For buildings, we put on a specular sheen that wood gets from dust that blows across "
John Bell, art director, ILM

there, they worked as an ensemble," Hickel says. The recording session lasted 20 days, the length of time Depp was available.

During the previous year, Verbinski had worked with artists in his offices to create a story reel from 2D drawings cut together. During the recording session,

a script supervisor checked the animators' pacing against that story reel. Afterwards, his editors added sound to the story reel; and in the spring of 2009, ILM's animators began work. Hickel and the lead animators would look at the story reel and videos of the dialogue sessions, then show those, along with Verbinski's 'turnover', to the animators.

Each character had a low-resolution model without a face and a higher-resolution model. The animators would pantomime the body first on the low-res model, then work on the facial animation using the higher-res model. "On this show, we knew the animators would have to work at a faster rate than normal, so we upped our game," Hickel says. "We added things to the rigs – a switch to go from IK to FK and other attributes to make the animators' job easier. And we asked for a GUI for each character.

■ Every TD dreads having to rig a snake. The movie's evil ringleader also features individual scales which required a lot of tidy-up by hand

◄ John Bell's art direction ensured that the town of Dirt has a classic Western feel

FROM SKETCH TO SCREEN

How ILM travelled the dusty road from thumbnails to Rango's finished frames

1 Gestural story sketches such as this one are created for each shot in the film, and used to denote shot composition and assist in the editorial process.

2 At the layout stage, ILM's virtual DPs set lensing and framing, and create any necessary camera movement to help tell the story.
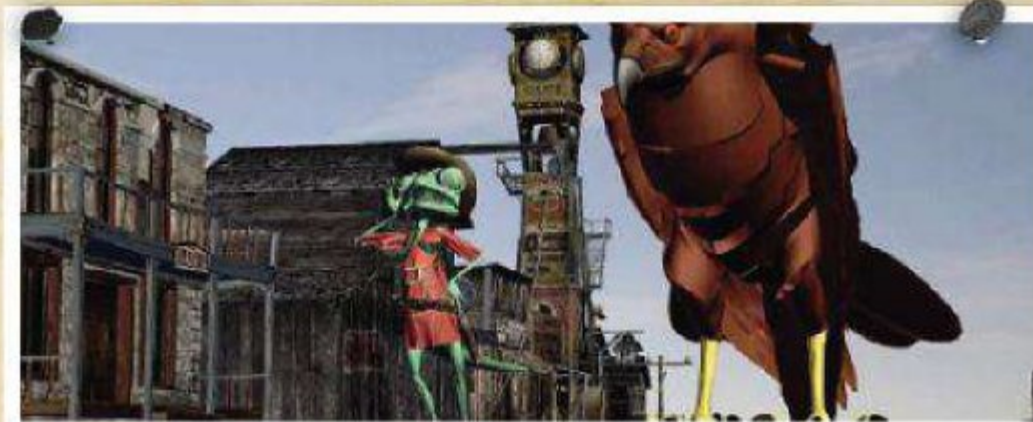
3 The animation team takes the shot and creates the keyframed performance for each character in the scene. Here Rango is unknowingly stalked by a ruthless hawk.

4 The finished shot shows the handiwork of the technical directors, whose lighting gives Rango its dusty, gritty look, along with the work of the compositing team, which combines sometimes hundreds of separate elements.

We had an animator working directly with James Tooley in creature development."

Tooley came to ILM from Disney, where he'd been one of the few computer animators on Beauty and the Beast, Aladdin and The Lion King. At ILM, he was a digital artist on Twister and quickly became a technical animation supervisor, leading teams of artists who rigged characters and handled cloth and hair simulation for the Star Wars and Pirates franchises, as well as other films.

"For Rango," he says, "I began by looking through all the sequences to see what the characters had to do, the behaviour of their skin, feathers and hair, to make sure we'd build in the proper techniques on a shot-by-shot basis. It was probably the biggest project I've worked on, with the most characters. [There were] 130 unique [bipedal] characters all treated kind of like hero characters, and then 45 to 50 variants for crowds and backgrounds. We also had a couple of quadrupeds, bats and birds. We had everything. Surprisingly, though, we didn't get asked for much more than usual in terms of rigging and simulation. Maybe less, sometimes."

Rigging was handled within Maya. To create the newly requested GUIs for each character, the team used MEL and Python scripts. In addition, some characters needed specific rigging. The snake, for example: "The two things everyone cringes about any time they come up for rigging are snakes and ropes," says Tooley. "If you pull on the tip of the tail, the rest has to follow in a specific way, so the rigs are sometimes really complicated. The rig for this snake was very complicated."

»

■ Johnny Depp's physical performances inspired Kevin Martel as he animated the lead character

■ ILM's experience on Pirates of the Caribbean helped it deal with the complex layered clothing on many characters

To move the snake, the riggers created a rail system, like a train track. Animators could move the track and the snake would follow; bend the track, and the snake would bend as well. "When the director wanted more snake, we might use two snakes – one for the head, the rest for the body," Tooley says.

Unless the snake was far in the background, each scale was a specific piece of geometry, but in most shots, the snake is close to the camera. That meant the scales had to move correctly as the body moved. "We used deformers and also wrote Python scripts to mathematically describe the motion," Tooley says. "We could take a partial derivative and provide that to rotation controllers."

If that didn't work, the crew would fix the problems by hand. "People don't like to talk about it, but we do a lot of manual clean-up, too," Tooley says. "Maybe the feature animation studios try to make everything bullet-proof. We're more down and dirty effects based. We do rigging as well as we can. And then we clean up. That's the typical approach for ILM. Noodling and fine tuning."

Skinning was straightforward for the more human-like animals, made easier because clothing covered much of the skin. The clothing brought its own problems, though. "Almost every character in every shot has multiple layers of clothing that we dynamically simulated," says Tooley. "But ever since the first Pirates, we've had to simulate multiple layers of cloth. We've developed techniques that allow us to simulate one layer and have a second collide with the first. We simulate the layers in a specific order."

Generally, that means working from the under-layer out. When a heavy garment is on the outside, though, they create a gap between the layers, using another surface to control how much the heavy garment mashes the lighter undergarment. Texture maps add specific controls that act like glue and keep a piece of cloth from sliding, for example, or cause two pieces of cloth to move together.

Unless two characters had to collide against each other, the character TDs ran the simulations for each character on separate machines, with several machines running at the same time. "The thing that makes cloth really look good is resolution," says Tooley. "But that makes the cost of simulation go up."
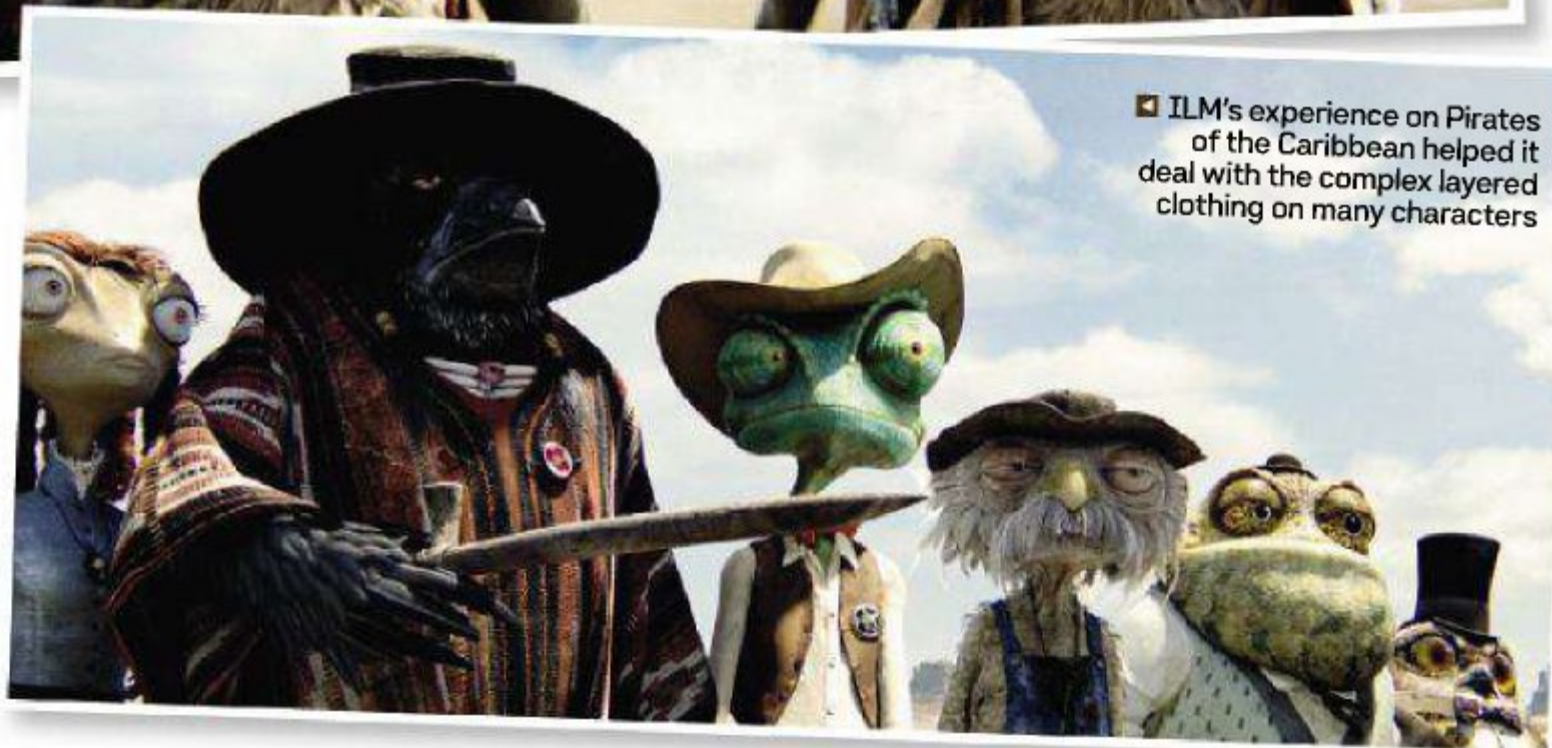
For the characters' hair, the studio uses a typical system with guide hairs interpolated in rendering to produce thousands of strands that TDs could clump into tufts to create a mangy look. "As far as simulation goes, we might run all the hair at the same time, or group clumps into different simulation passes to have the different clumps behave in different ways," says Tooley.

In addition to characters, the creature development group rigged props, cars, building parts and vehicles. "If it moved or articulated in any way, my crew had to deal with it," says Tooley. "The wagons had to roll." For example, to help the animators roll Beans' wagon, which a javelina (or collared peccary) pulls, the crew connected the wagon dynamically to the wild pig. Wherever the animators moved the javelina, the wagon – a rigid

body simulation – followed; and as it moved, it collided properly with the ground terrain.

Ground rules

The task of creating that ground terrain fell to the digimatte department. Typically, this ILM team creates 2.5D backgrounds for live-action films: 2D paintings projected into a 3D space for largely camera-dependant shots. When a shot comes into the digimatte department, the artists know the camera move and the lighting. Originally, the department planned to create the same kind of exteriors for Rango.

"We did initial tests using our paint projection tricks and they looked good," says digital matte supervisor Andrew Proctor. "They helped set the photographic look that Gore [Verbinski],

> 66 My full-time job was doing render triage work. Rather than having individual technical directors dig into solving problems, we had a dedicated few people looking at noodly problems with complicated solutions 99
> Pat Myers, CG supervisor, ILM

RANGO'S WORLD
How ILM developed the Western-look environments in Rango

1 Sketched storyboards are cut together to create a story reel representing the entire film. Here we see a frame of a posse overlooking the desert.

2 A refined black-and-white illustration is created by ILM concept artist Christian Alzmann to tighten up the details.

3 ILM Art Director John Bell's completed paint over colour study of the earlier Alzmann treatment.

4 With concept art turned over to the layout team, camera position, lens selection and shot framing can begin. Character models are brought into the composition and positioned, as are major scenic elements in the shot.

5 With rough layout complete and signed off on by director Gore Verbinski, the shot is delivered to the animation team for character performance.

6 With animation complete, ILM's technical directors take the shot to new heights, as lighting simulations and atmospherics are added and the shot, seen here in its final form, is rendered.
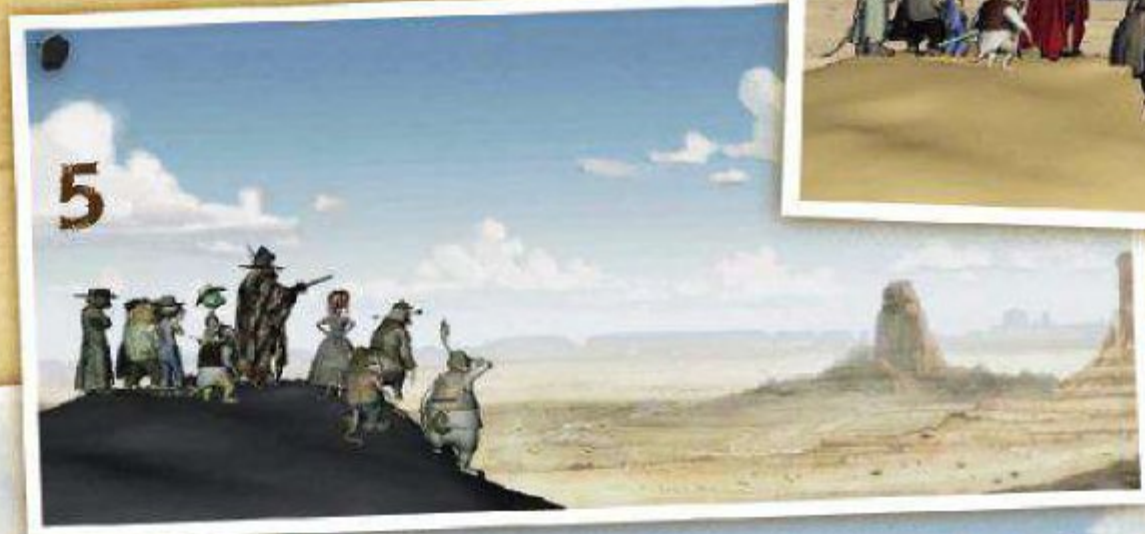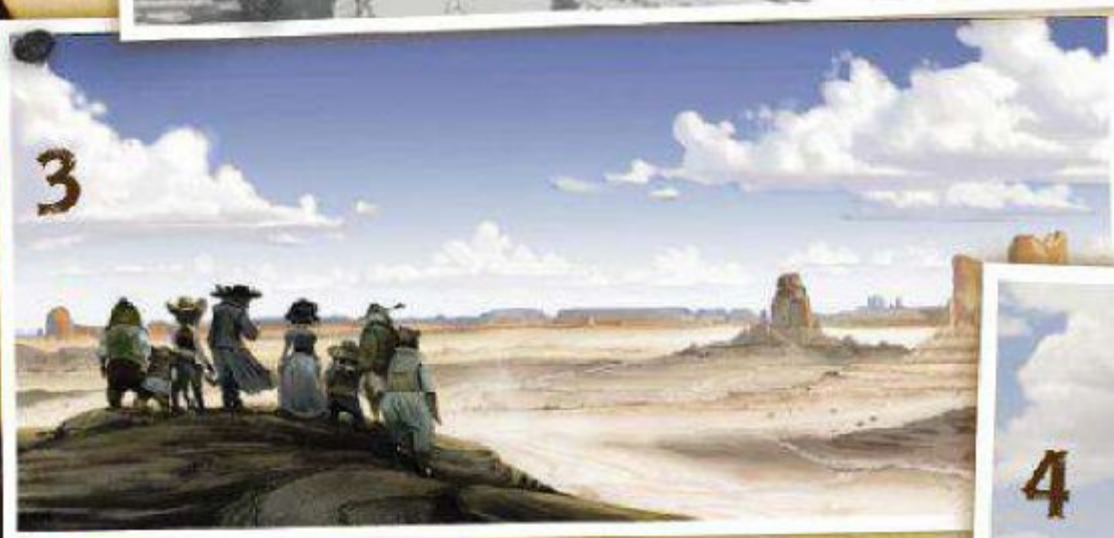
▼ Darned critters: Rango features 130 distinct characters, with most posing the challenge of blending human and creature characteristics

◄ Into the sunset: with Rango's core team more versed in VFX than animation, the film acquired a distinctive live-action look
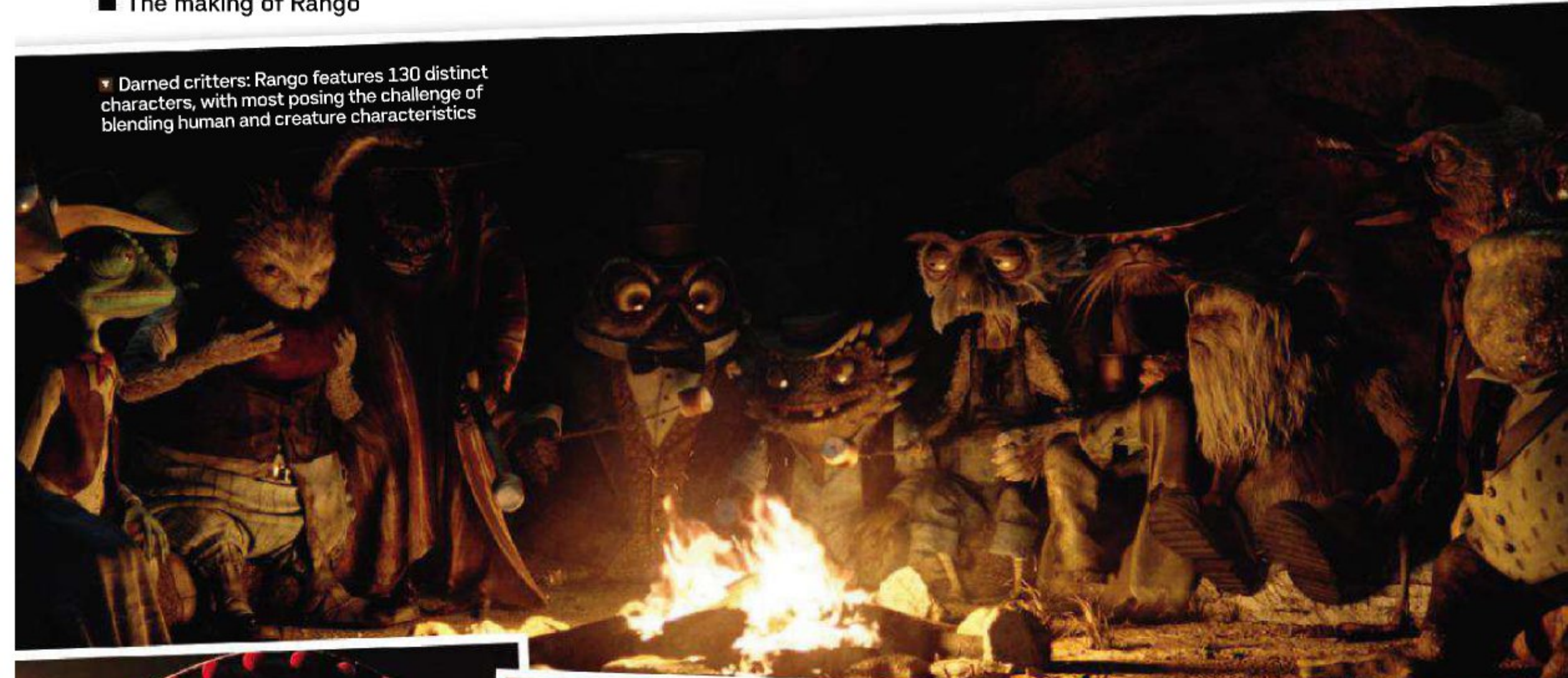
◼ Unusually for a lead character in a feature animation, Rango wears a variety of different costumes throughout the story

Tim [Alexander] and John [Knoll] wanted. But once we started to work closely with Gore in pre-production, it became clear that we couldn't tie down the environments that early. We went back to the drawing board."

> ## " We thought maybe not knowing how you're supposed to do things might be a good thing "
> Hal Hickel, animation supervisor, ILM

Instead, the team created a process in which they first established a rough layout that Verbinski and the layout artists could use to scout locations and establish camera angles. The rough layout had an undulating ground plane with colour, detail from repeated fractal patterns, cliffs, rocks and buttes with rough textures, and a sky. "We had a sky cyclorama based on time of day and key artwork," says Proctor. "We built a full 3D cyclorama for Gore to give us feedback on whether the clouds and buttes were

in the right place. We kept the sets alive as long as possible. Then we'd go in and polish, using our tools to make them more shot-specific."

Because it wasn't feasible for the painters to create the massive texture maps needed to detail the wide open spaces, the crew developed a procedural terrain shader. "It would take full maps, colour and bump maps, and blend them across the whole set," says Proctor. "We could control the size of the pattern and the harshness of the landscape."

The artists could also control the patterns so that they wouldn't stack up at the horizon.

To add shrubs, cacti and other large elements, the matte painters could fill an area with pre-baked elements using a procedural map or paint proxies into the landscape using a tool similar to the paintbrushes in Maya Paint Effects. "Crash [McCreery] would often sit with the artists and set dress the shots," says Proctor. "We could move things around and he could art-direct to his heart's content."
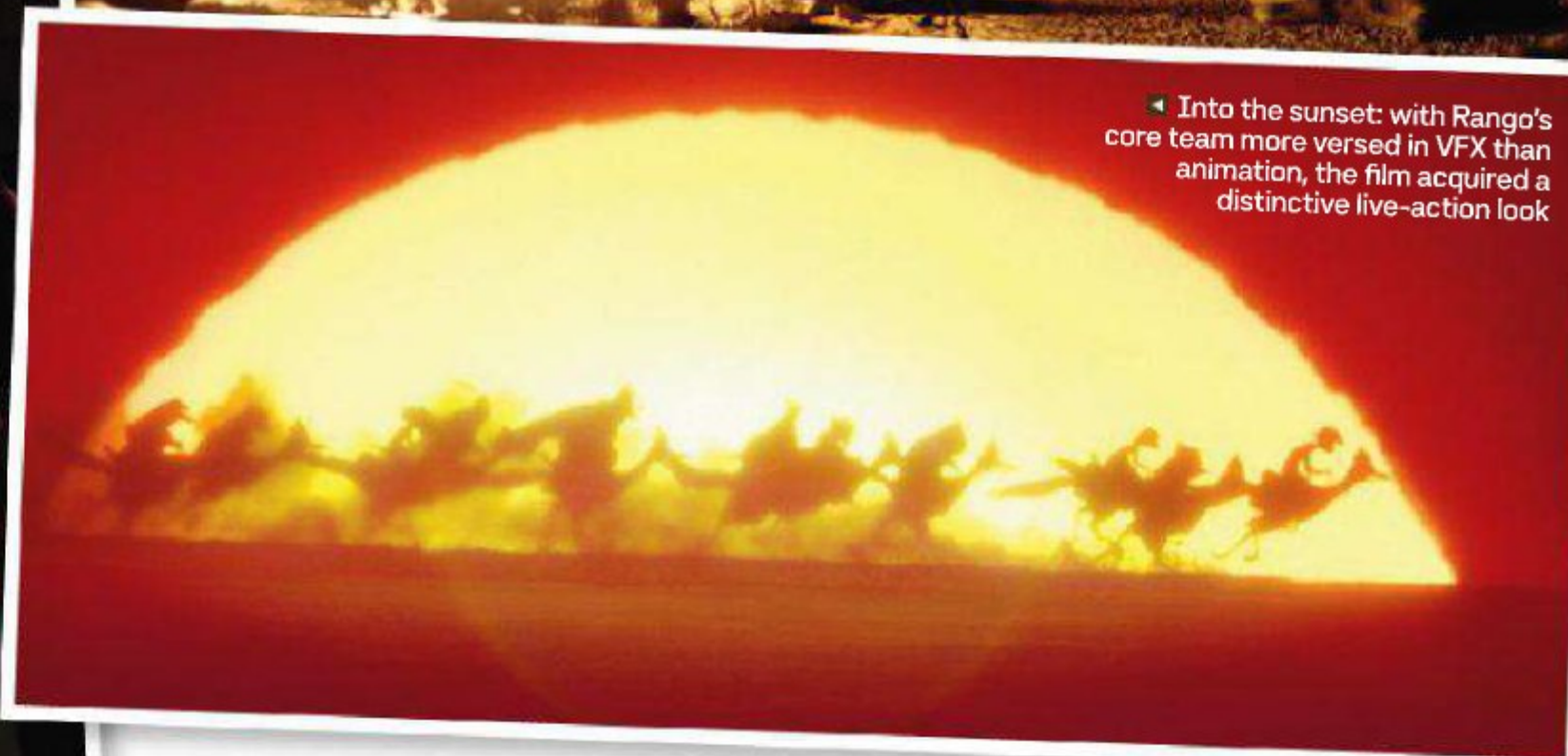
For many of the matte painters, who typically stay outside the 3D pipeline, stepping more fully into the 3D world was a radical new way to work. But for Proctor, it was a way to use skills he'd learned at Aardman Animation and the BBC, thn moved into the digital world by creating hard-surface models for Flushed Away. "My background is environments," he says. "At Aardman, I did character sets, textures, lighting, art direction – everything except animation. I think that at ILM because I wasn't from the digimatte department and had strong 3D and 2D skills, I could offer a lot to help set up the 3D stuff. The project was really exciting for me."

Creating procedural textures to make it possible for Verbinski to do location scouting was just one way in which this production differed from a typical feature animation pipeline. Down-and-dirty rigging. Ensemble recording. Digital maquettes. Whether the process they created would work for a group of people with strong animation backgrounds isn't clear, but this nimble crew took what they needed from the typical animation process, mixed in familiar and successful ways of working in live-action visual effects, and crafted one of the most distinctive animated features ever to grace the big screen. ●

Rango went on general release in both the UK and the US on 4 March
rangomovie.com

THE DEVIL IS IN THE DETAIL

Meet one of the texture artists behind Rango's distinctively dusty, weather-worn surfaces and clothing

"I was going over some numbers, and it was staggering," says Steve Walton, a viewpaint supervisor for Rango. At ILM, viewpainters paint texture maps. "37 buildings. 1,000 props. 28,000 set dressing objects. Rocks, pebbles, grass, cactus. 130 characters. Looking back, I think, 'Oh my goodness: that's what we did for two-and-a-half years.' "

During that period, Walton led a team that grew to 20 painters, who provided much of the gritty visual complexity in Rango for the town and the characters. "Early on, Gore [Verbinski] and the story people came up and helped us get in the vibe," says Walton. "We had a vibe room decorated with spaghetti western posters and cactus. We watched Once Upon a Time in the West. Everyone in the film was greasy, grimy; not pretty, not cute."

If artwork from Crash McCreery and descriptions from Verbinski weren't enough, the director had another way of making his point. "Gore is colourful when he describes how he wants something to look," says Walton. "He reduces descriptions to sound effects. He gets this crusty, cowboy voice and goes 'rrrrrgh'."

To translate McCreery's drawings and Verbinski's growly descriptions into digital images, Walton worked with Damian Steel, look development technical director, who did material assignments. "We'd look at the results every day for months, and Gore would say, 'I need a little more rrrrrgh.' I had to translate that into a look. One time, Gore stood over me, waved his hands over my head and said: 'Do your magic.'"

To help Walton do just that, McCreery brought in costumes from Universal Studios' wardrobe department. "He wanted us to see the sweat stains, the dirt stains," Walton says. "To feel the fabric."

With few exceptions, the characters all wear costumes, and Rango wears several. "We don't just paint the character once," Walton says. "Rango gets muddy, he gets dirty; different things happen to him. He goes on set and we have to react to everything that happens to him."

Modeller Frank Cravat created Rango's major skin patterns, using ZBrush displacement to produce bumps and scales. Walton added smaller details using black-and-white texture maps that fed the RenderMan shaders and controlled surface characteristics such as shininess, translucency and subsurface scattering. How many texture maps in all? "Oh my goodness," Walton says. "Let me count one row then count across. Okay: 120 different effects maps. 20 colour maps. We had such a variety of things that

happen to him. Luckily, I sit next to Damian. We came up with a strategy for keeping track of maps, and we shared the strategy with as few people as possible. We'd make sure the right stuff went to the right shot. We attached our phone number and said to call if they had questions."

Look dev for the characters lasted about a year. "An artist would come in and make an extra mangy character and the favourite would change," says Walton.

"Like the inbred rodents. They were really gross. Odd-shaped, super-mangy. That's when we went too far. Gore said, 'You can go bumpy, crusty, sunburned. But let's stay away from puss. I'm not into puss.' "

This isn't the first time Walton has worked with Verbinski: he was a texture painter on the Pirates films. Before that, though, he spent eight years in ILM's model shop painting practical models,

> 66 We'd look at the results, and Gore [Verbinski] would say: 'I need a little more rrrrrgh' 99
> Steve Walton, viewpaint supervisor, ILM

a job he landed by accident. "I studied fine arts in school," he says. "Painting on canvas. And everyone asked me what kind of job I could get. My first job was painting the back of a set for a rock concert with fireproof black.

"Now, I'm painting sets again," he says. "But in a nice warm room, not in some random warehouse. I was worried about going into the computer side, but really, the skill set translates one to one."

□ Rango director Gore Verbinski (standing) takes the ILM animation team through a series of concept designs

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W e've joined forces with The Pixel Farm this issue to offer you the chance to win a copy of PFMatchit plus a year's support and maintenance – a package worth £600. What's more, two runners-up will receive a licence for the intuitive desktop tracking powerhouse that is PFhoe Pro, as well as a T-shirt – prizes worth £99 each.

When doing effects work, one of the tasks you'll encounter is to seamlessly combine a live-action background shot with computer-generated foreground elements. PFMatchit is a pro-grade solution built on innovative node-based flowgraph architecture and provides a logical, visual overview of the tracking procedure.

PFhoe takes the core match-moving principles and technologies behind The Pixel Farm's products and bundles them into a simple-to-use package to suit beginners and pros alike. It enables you to quickly perform tracking tasks, and features full HD support, an automatic lens distortion correction tool and a unique focal length detection system.

For this contest, we're inviting you to add your own effects to a shot that has been tracked using PFhoe, then upload the result to YouTube.

To enter, go to **pfhoe.com/3D_World_Promotion**, where you can download footage shot in Los Angeles, along with the PFhoe project file. All you need to do is use the tracking data in your app of choice and add your VFX. PFhoe supports 3ds Max, After Effects, Animation:Master, Blender, Cinema 4D, Combustion, LightWave 3D, Maya and Softimage. You don't need to have a PFhoe licence to use the tracking data.

What you do with the footage is up to you. Want to add a small robot or radio-controlled car? Maybe you'll insert swirly motion graphics or particles. Feel free to do whatever you like – the more ingenious and creative, the better. And feel free to add effects to the footage itself too (if you'd prefer it a different colour, for example). If you need a little inspiration, you can see other example videos using PFhoe at **pfhoe.com/userprojects.php**.

Once your footage is complete, export it as a movie file and upload it to YouTube (**youtube.com**), using the tag **PFHoe_3DWorld**. Movies must be uploaded by the closing date of 10 June 2011. Entries will be judged based on their technical quality, creativity and popularity. ●

How to enter

This issue, we're giving away one licence for PFMatchit and two licences of PFhoe Pro. To access the material required to create your entry, visit **pfhoe.com/3D_World_Promotion**. You must use the video and tracking data provided, but you may add your own assets, and you may use any software of your choice to produce your movie. Upload your movie to **youtube.com** with the tag PFHoe_3DWorld; entries without this tag will not be accepted.

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Ten reasons why your renders suck

(and what you can do about it)

Certain basic errors crop up time after time in rendered images. So this issue, we asked ten leading artists to nominate their own pet hates – and explain how you can avoid them

Not yours, of course. Your renders are lovely. But looking round the online galleries, you can't help noticing that not every rendered image is a work of genius. And time after time, the same basic errors crop up: blown highlights, unrealistic materials, incorrect depth of field. So this issue, we asked ten leading artists to nominate their own pet hate and then to provide a simple, practical solution to the problem in question.

Their answers range from general issues, such as the use of unbiased engines, linear workflow and 32-bit file formats, to specific errors including incorrect scene scale and material properties. Many of the examples provided are visualisation stills, because the high resolutions at which such images are rendered show up even the smallest errors, but the same principles apply to animation and visual effects work. It's an issue that affects every 3D artist.

Some tips are specifically for mental ray, since they can be implemented by users of 3ds Max, Maya or Softimage, but we've tried to keep the majority non-software-specific. The illustrations accompanying them were created in a range of packages, from modo to Indigo Renderer.

The article is indebted to Blender Guru's Andrew Price (**blenderguru.com**), who posted his own list of reasons why renders suck on his website early last year. The original list, which can be found at **tinyurl.com/originallist**, included both technical and artistic sins, and generated over 100 replies when it was reposted on the CGSociety forums: some in agreement, some taking issue with individual points, and some suggesting new ones. You can read them at **tinyurl.com/cgsocietythread**.

Based on that feedback, we've changed the rules slightly for 3D World's list: we've avoided points based on artistic rather than technical criteria, and for each problem we've tried to provide a specific practical fix. And what were those fixes? Read on to find out…

01 You aren't using characters sympathetically

Most clients now expect characters in the visualisations you create, either to communicate a sense of scale, or to illustrate how people will use the space depicted. Consider the response these characters will evoke in the viewer. You should place them with as much care as you devote to the composition of the scene itself.

First, ensure your characters are 'idle'. Placement often fails when the implied movement of a character is too complex or exaggerated. If you do need moving characters, make sure they aren't walking directly towards the camera.

As viewers, we focus on the faces of characters. This can create problems with the Uncanny Valley. Having characters look away from the viewer minimises this. Instead, have them look towards the focal point of the image to reinforce its impact.

Even when creating a still image, use characters that have animation applied. This enables you to scrub quickly through the timeline and choose appropriate camera angles, ensuring you don't have exactly the same poses in each view.

It's also a good idea to group people in your imagery. In the real world, most people walk in pairs or as family groups. 3D visuals often show characters only as individuals, making the result feel less natural to the viewer. As well as considering spatial placement, group characters according to the overall tonal range of the image. Ensuring that the colour of characters' clothing matches that of the background helps them to blend in, ensuring that the focus of the image remains on the architecture.

Jamie Gwilliam is a 3D application specialist at Autodesk, concentrating on the use of 3ds Max. He previously worked as a senior visualisation artist at various architectural and industrial design companies
jamiesjewels.typepad.com »
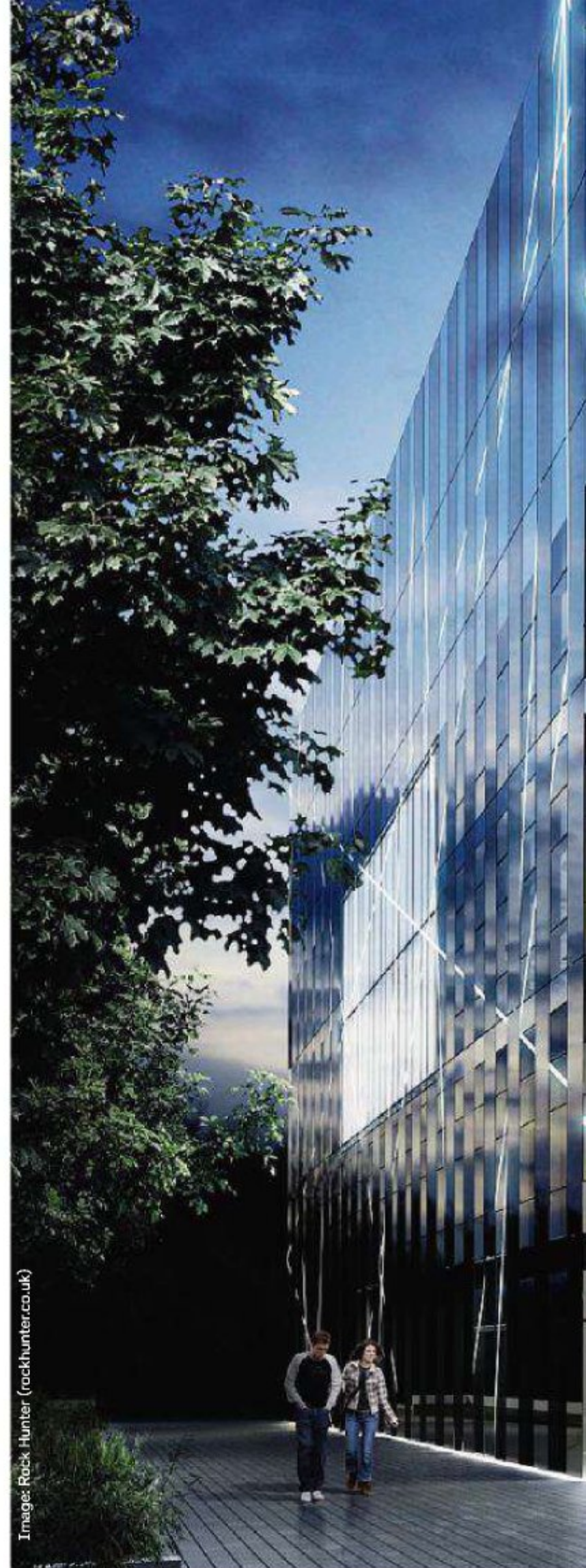
Image: Rock Hunter (rockhunter.co.uk)

▶ Matching the colour of characters' clothing to that of the scene helps the viewer focus on the architecture
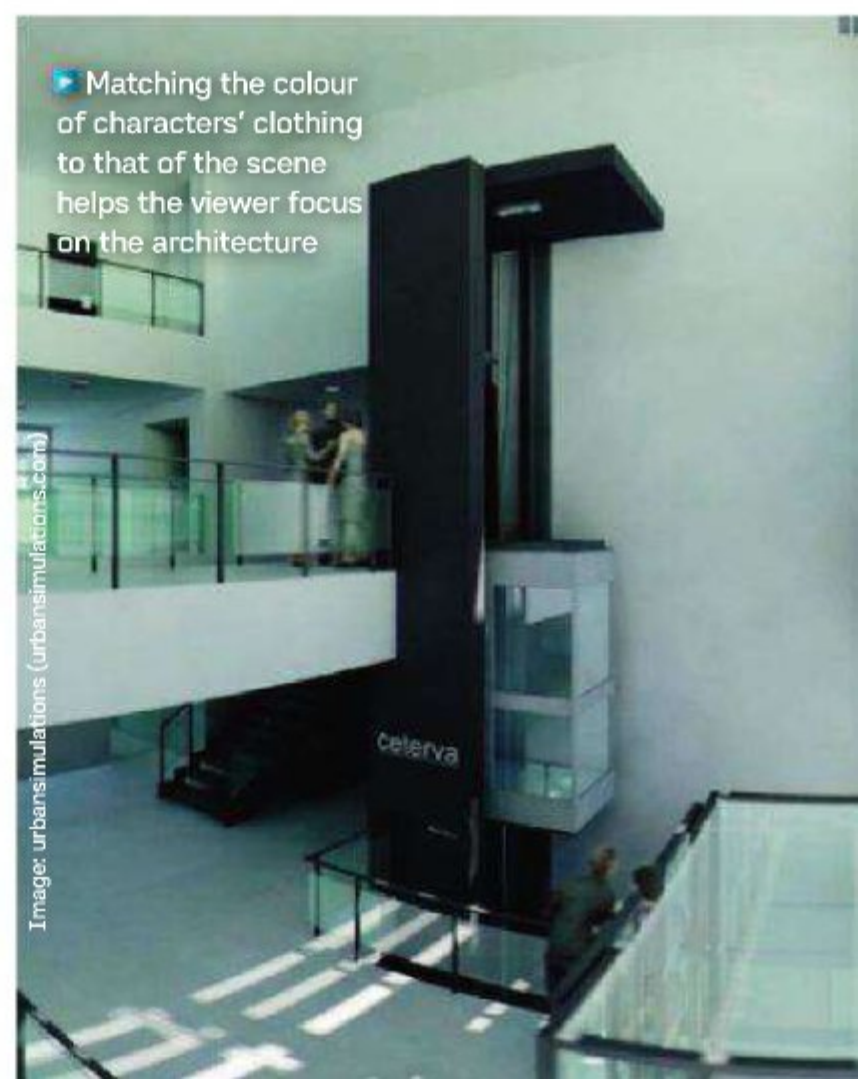
Image: urbansimulations (urbansimulations.com)

Don't have characters facing the camera: it risks the image falling into the Uncanny Valley. Having them face the focal point of the render reinforces its importance

Image: Uniform (uniform.net)

To keep the number of preview renders down, pack more than one variation in scene properties into each one. Here, materials, lights and composition all change from preview (inset) to final image (above)

02 You aren't using physically accurate workflow

As hardware gets faster, the skills used to 'cheat' lighting setups to achieve realistic results are gradually becoming obsolete. Physically based materials and lighting generate effects such as soft shadows, colour bleeding and blurry reflections that can help a render jump the Uncanny Valley.

While the result is rewarding, a physically based workflow often comes with the cost of long render times – and this can also slow down your preview

workflow. Make use of network rendering for previews as well as final-quality renders. Set batches of multiple previews rendering overnight and even during your lunch break.

To speed up individual preview renders, use light portals in your scene if possible and reduce light bounces when previewing. Develop materials and assets outside the main scene file and polish them there individually: the total render time will be shorter than if you tweak them inside the full scene.

For whole-scene previews, combine as many of the individual changes as you may need in each

test run, including variant materials, lighting and composition, as illustrated above. If the changes you need to make are smaller, use region rendering to focus render power on the area of interest, rather than test-rendering the entire camera view.

Arthur Staschyk is a freelance designer, animator and visualisation artist, working for German print and broadcast agencies. He is also a leading light in the user community for Indigo Renderer
arthur-staschyk.de

A RIGHT   **B** WRONG   **C** SIDE BY SIDE

03 The relative proportions of your scene are wrong

Pay close attention to relative proportions in your scene, not just in your models, but also in your textures. Get used to thinking and working in real-world units (metres are good) and set your 3D software to show them.

When creating a new object, model it to scale and at the origin of the scene. This way, you'll build up a library of useful assets that retain the correct scale

when merged into your latest masterpiece. A selection of non-renderable guide objects can also be helpful when modelling from scratch.

Keep an extra close eye on small details. Fine surface textures can easily be two or three times out: for example, the tooth on plastics, wood grain, fabrics, or textural relief on wall or ground surfaces. Slim objects are easy to neglect too – perhaps small variations in their width feel a bit insignificant – but they're important, especially when they appear

en masse. We're all familiar with the way cords, wires and especially hair and grass look, so it'll compromise your image if they're too slim or too coarse.

Ed Taylor is a creative lead at visualisation and post-production studio Taylor James. He's worked on dozens of commercials and designed a number of internationally successful kids' animated series
edtaylor.co.uk, taylorjames.com

04 You aren't using blur correctly in your images

When trying to achieve a photographic look, artists usually render a hyper-real crisp render that's far sharper than most photographs. They then blur their rendered images using a compositing package. However, blurring an image in post simply averages the pixels together and can produce unsatisfactory results. It also adds an unnecessary step to post-production work. A better method is to render with a softer filter such as mental ray's Gauss filter. The default Filter Width and Height Size can produce results that are too soft, though, so try reducing the values to 2.0 or 2.5 to get something a bit sharper.

▶ Choosing correct filter settings for your render eliminates the need to apply blur in post, and can give more subtle results

▶ Rendering with mental ray's Gauss filter gives a softer, more photographic effect. The settings above should give good results
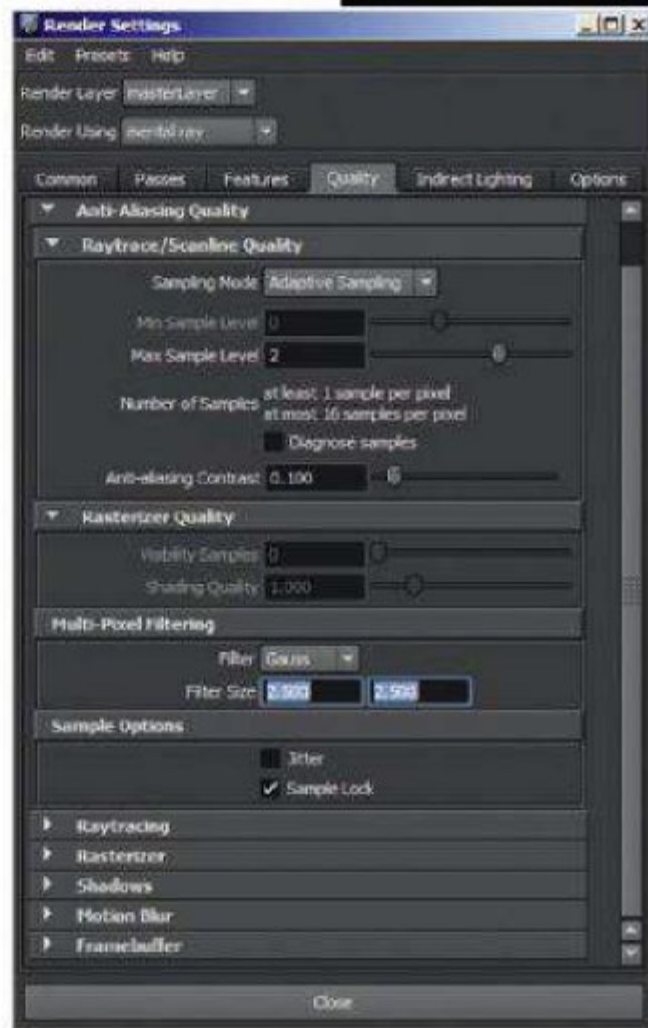
Lee Griggs was nominated as a Maya Master in 2004. He freelances for studios including Framestore, Prime Focus and Red Vision, and is currently working at Happy Finish
leegriggs.com

05 You aren't using 32-bit workflow

When rendering an image in 32-bit colour space, you gain the extra information required to make drastic lighting and mood decisions in post. This defers many of the artistic decisions necessary until you're working with the image inside a compositing package, where multiple looks, styles and moods can be tried out in a fraction of the time it would have taken to re-render the scene in your 3D software.

A 32-bit workflow also minimises artefacts such as banding and splotchiness, which are almost always present in highly modified non-32-bit images: note the banding in the shadow at the base of the keg in the 24-bit render to the immediate right of this text.

All major render engines now support 32-bit formats, such as OpenEXR or 32-bit TIFFs, so there's no longer any excuse not to use this valuable technique.

Rabih Haddad is CEO of visualisation and VFX agency BlackSmith Studios, with clients including HSBC and Heineken. He was previously a pipeline design consultant for Framestore and The Orphanage
blacksmithstudios.com »

◀ A 32-bit workflow (right) minimises artefacting. Note how much smoother the shadow at the foot of the keg is than in a 24-bit render (left)

A A test render with no tone mapping. Note how the highlights are burnt out

B All of the light intensities lowered manually: less blown out, but still unacceptable

C With tone mapping and gamma correction applied: a much more realistic result

D Tone mapping plus the mental ray glare shader and higher antialiasing: better still

06 Your tone mapping is incorrect

Tone mapping is something a lot of newcomers to CG miss. For a more detailed description, check out the websites in the 'Further reference' box, but here's the good stuff.

Your monitor is limited as to the lighting levels it can display. However, your eyes can see an almost unlimited dynamic range between very dim and extremely bright. Tone mapping saves the day by adjusting the lighting levels in your scene so that your renders appear to be more realistic.

Tone mapping is supported in most modern render engines, but to activate it in mental ray inside 3ds Max, go to the Environment and Effects window and then the Environment tab. Under the Exposure Control rollout there's a drop-down list of exposure control methods. Choose mr Photographic Exposure Control.

This will create a new rollout with more options. The easiest way to get started is to select a preset: for example, Physically Based Lighting, Indoor Daylight. This will set up most parameters automatically, although you may have to tweak them by hand to get a result that fits each individual scene more precisely.

Under the exposure settings, you'll see the Gamma/LUT Settings options. By default, these are turned off. When we render with the mental ray exposure control, mental ray internally renders with gamma on, at a value of 2.2. This is adequate in most cases, but can sometimes wash out an image.

If you like to have more control, click the Setup... button and enable gamma correction at the value you like: sometimes I use 1.8, but experiment for yourself. With mental ray exposure control and gamma correction both on, your scene will be tone mapped upon rendering, and you'll end up with a more desirable result.

Leonard Gonzalez is training director of i3DTutorials.com, an Autodesk Authorized Publisher of CG training products used at studios including Ubisoft, Insomniac Games and Lionhead Studios
i3DTutorials.com

07 Your shaders don't match real materials

Good renders need good shaders – yet shader setup is something many artists neglect. Run through this checklist of key properties when you set up each new shader, and you won't go far wrong. Screenshots showing appropriate settings for 3ds Max and mental ray can be found on the disc.

A Bump and displacement

Bumps and/or displacement bitmaps play a crucial role in enhancing textures. In order for their effect to be noticeable, you need enough segments on the 3D objects to which they're applied. Use photos as a guide to determine the appropriate settings, particularly the Blur value, tweaking it to control how the surface reacts to light.

▶ Bump maps are crucial to realistic-looking materials. The Blur value adjusts the overall effect

Realistic shaders in action in a 3ds Max/mental ray render

B Rounded corners

The Round Corners function chamfers sharp edges of 3D objects. Since most real objects are somewhat chamfered, this is imperative. To find the correct Fillet value, artists often create dummy chamfered box geometry of a similar size to a model and play with the settings on this. This trick prevents artefacts on the actual rendered surface.
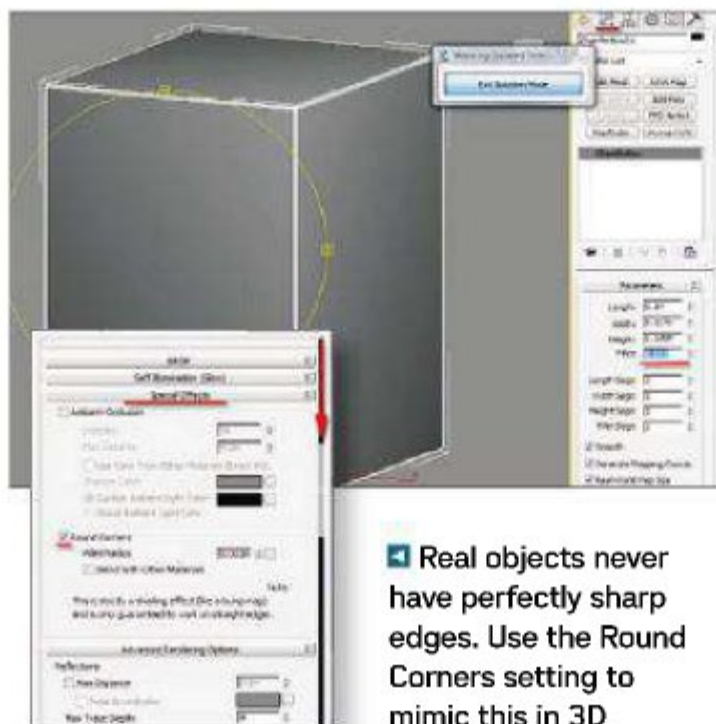
◄ Real objects never have perfectly sharp edges. Use the Round Corners setting to mimic this in 3D

C Glossy highlights

Glossy highlights play an important role in making a render look appealing. Most striking photos contain glossy highlights, so use of the Relative Intensity of Highlights setting is a must. Its correct value is dependent on the lighting and HDRIs used in the scene; it works independently and in conjunction with the main parameters rollout. It also helps amplify the effect of the Round Corners function.

◄ Glossy highlights can be adjusted from the Advanced Rendering Settings rollout

D Reflections

It's common for highly reflective objects to lose their original colour and/or surface texture. This is a natural phenomenon, but to help override it, users often enable the Metal material setting. This function essentially helps maintain the diffuse colour/texture. Alternatively, to use glossiness without reflections, you can simply enable the Highlights+FG only setting.

To further control the intensity of the reflections on any given surface, you can also use the Custom Reflectivity Function from the BRDF rollout. To prevent artefacts in glossy reflections, use a Fast Glossy Interpolation > Interpolation Grid Density setting of 1 (same as rendering) or higher. If necessary,

◄ The Metal material setting helps prevent diffuse colour being bleached in highly reflective materials

also adjust the Glossy Reflections Precision and Glossy Refractions Precision sliders.

Finally, it's worth pointing out that rendering images lower than 2,500 pixels in width may cause them to look slightly grainy, no matter what shader settings you use. To prevent this, simply render at 2,500 pixels or higher, then scale the render to the correct size.

E Colours

In addition to using Photoshop to correct colours, use the Composite or Color Correction shader on top of your original shaders. Colour bleeding GI and/or Final Gather can at times change the original colours of textures in the render, and the shaders' powerful functionalities will help rectify most colour problems.
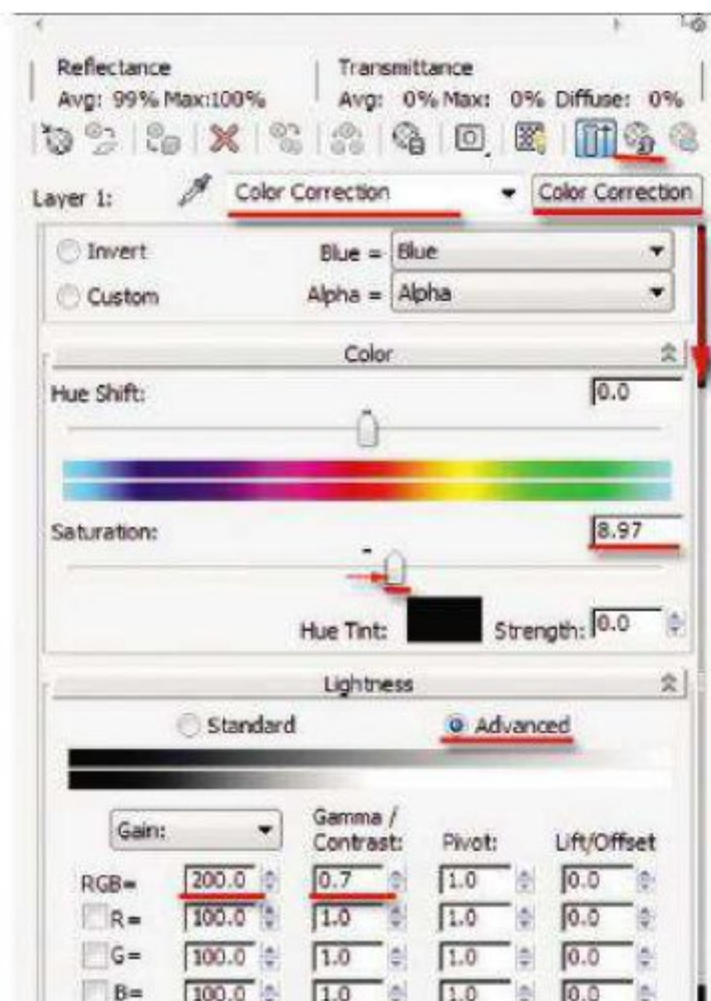
◄ The Color Correction shader offers an alternative to adjusting a render in Photoshop

F Indirect illumination

Finally, a material's Indirect Illumination Options settings also help it emulate the apparent physical properties of an object. The image below shows the key settings in the Advanced Rendering Options rollout. Used in conjunction with the other properties discussed here, it should help you set up shaders for striking, more realistic renders.
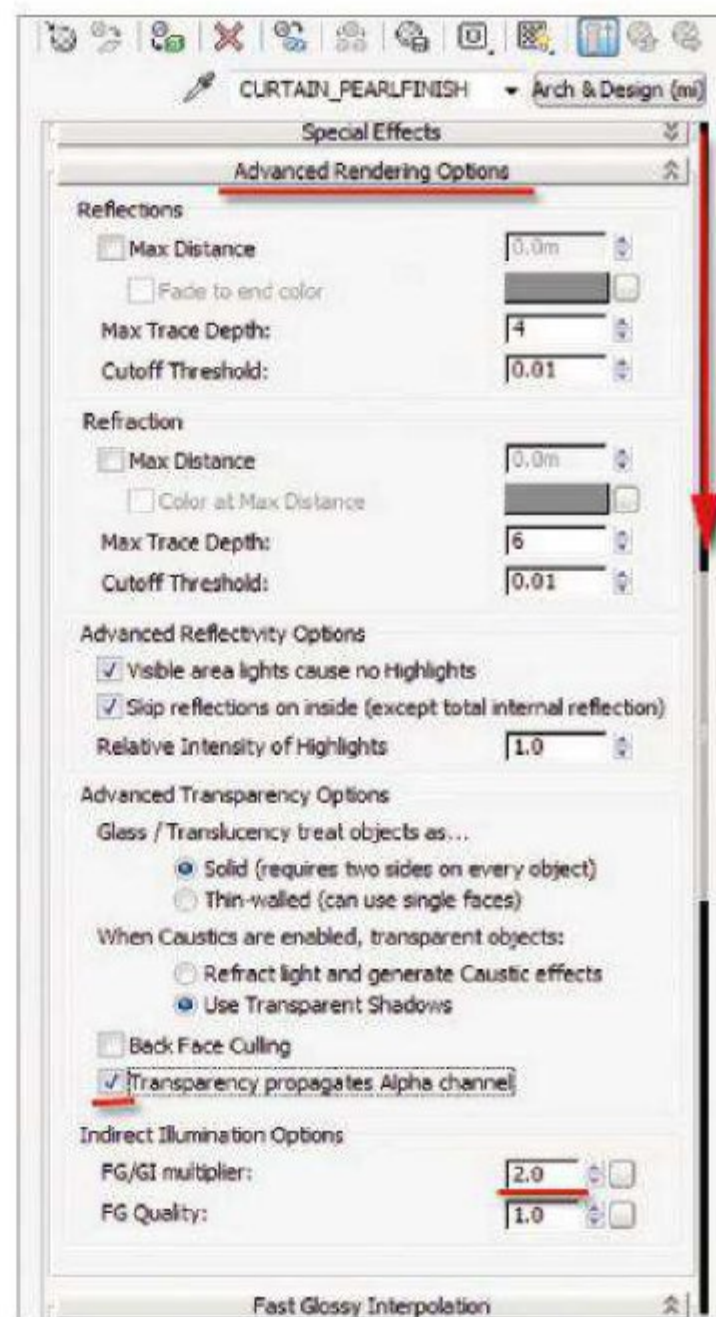
◄ The Indirect Illumination Options settings, also found in the Advanced Rendering Options rollout, put the finishing touches to your shader. The image above shows appropriate parameter values

Jamie Cardoso is a leading visualisation artist. In addition to writing for CGSociety and 3DTotal, he's co-author of the book Realistic Architectural Visualization with 3ds Max and mental ray, and runs a popular mental ray blog
jamiecardoso-mentalray.blogspot.com

A A test scene rendered with a single point light. No shadow softness at all

B The scene re-rendered with an unrealistically large light source. Better, but too soft

C And finally, with a light source the correct size for real-world scale. Spot on!

08 The scale of your lights is wrong

The scale of your light sources directly controls the sharpness of the shadows they cast. The larger they are, the softer the shadows. Therefore, your virtual light sources should reflect the size of their real-world equivalents, whether this is an incandescent bulb or the sun. For example, a bulb ought to be approximately 75mm in size and set to Spherical to give a uniform diffuse effect in all directions.

Use a light type that matches your real-world light source. For long fluorescent tubes, use Cylindrical or Line. For spotlights, use Spotlight or IES. For any self-contained lights, such as bulbs in lamps, use the Spherical option.

Remember that if there are no shadow-casting or shadow-receiving objects near your light source, it's pointless to use soft shadows, since the shadows will appear sharp regardless of the light's size. Point lights don't exist in real life, as they give no softness whatsoever, but in such cases (or in complex animations where accuracy is less important) they can have their uses.

The larger your light source and/or the further away from other objects it is, the more shadow/light samples you'll require to reduce noise and artefacts. However, more samples equals more render time. For animations in mental ray, 8–12 shadow samples is usually fine. For production stills, a value of 16–32 usually works best.

With unbiased renderers such as Maxwell Render, your 'lights' are actually just geometry with emitter shaders applied, so the scale of the light is simply controlled by the geometry of the light source. In mental ray, you can light scenes in a similar way by using self-illuminating Arch & Design materials on your objects, but you'll need a relatively dense and accurate Final Gather Map to avoid flickering and blotchiness, so this isn't recommended for most standard scenes.

Alex York has over five years of experience in the architectural visualisation industry, working for leading practices including Foster + Partners, Richard Rogers Partnership and Barton Willmore
alexyork.co.uk

Image: Alex York 2010/2011 (alexyork.co.uk)

◪ A more complex example of real-world scale. In this rendered still, the two side lamps are throwing diffuse shadows onto the back wall. The shadows cast through the large window are so soft because the source is environmental (secondary) light. Note that the shadows still retain visible sharpness close to the contact points of objects with the rug and floor: notably the bed legs. The aim of this shot was to keep lighting soft and cool to match the wintry exterior visible through the window.

09 You aren't using accurate displacements

Your underlying geometry affects the way a model reacts to light, affecting the resulting render. Displacements are a great way to add detail to an organic mesh here.

There are two things you can do to improve their quality. First, use a base mesh that accurately represents your mid-level details: the more accurate your base mesh, the better the final result will be. Second, try using vector displacements instead of standard displacements if your app supports them. A standard greyscale displacement only defines displacement distance: a vector displacement incorporates RGB values to define both direction and distance. This gives a much more accurate representation of your original sculpt, meaning you're less likely to run into baking accuracy issues.

Greg Brown is a CG artist at the Chicago-based virtual photography and illustration studio Alter. His primary speciality is digital sculpture, but his skills extend into lighting, shading and rendering
thinkalter.com »
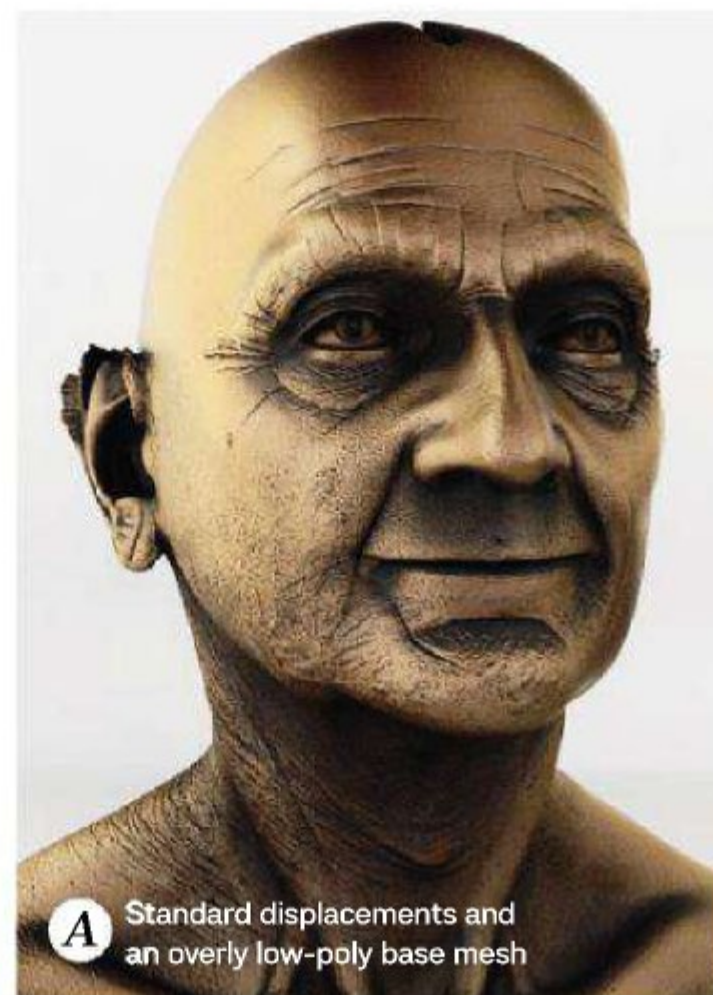
A Standard displacements and an overly low-poly base mesh

B Vector displacements and an accurate base mesh

C The final image. Combining HDR and direct lighting can augment displacements, while adding subtle depth of field lends realism to an image

10 You haven't matched the real-world camera

It's often necessary to fit a CG element into a photograph, or vice versa. To do this accurately, you need to ensure that the properties of your render match the artefacts generated by the camera. Here is a brief checklist of points to consider:

> **Chromatic aberration** Real photographs exhibit colour fringing at the edges of objects. It's vital to match this at a sub-pixel level. Subtlety is the key here – go too far and the result will look like a 1980s 3D film.

> **Vignetting** This is the darkened area that forms around the edges of a photograph.

> **Depth fog** Details in the distance often have a hazy fog surrounding them, even on clear days.

> **Edge blur** Although not a camera effect, blurring the edges of a CG element slightly can often really help it fit into a scene.

> **Colour correction and curves** Make sure that both highlights and shadow areas in your render match those of the photograph in hue and value.

Tick off these points each time you set up a 3D scene, and you should find the resulting render blends seamlessly with your photographic material.

Dan Grover is a designer at leading architectural visualisation agency Crystal CG International. He's been a speaker at Spain's Mundos Digitales conference, where he discussed stereoscopy
crystalcg-international.com

STEP BY STEP Camera matching

HOW TO ENSURE A RENDERED OBJECT MATCHES ARTEFACTS PRESENT IN THE PHOTOGRAPHIC BACKPLATE INTO WHICH IT IS COMPOSITED
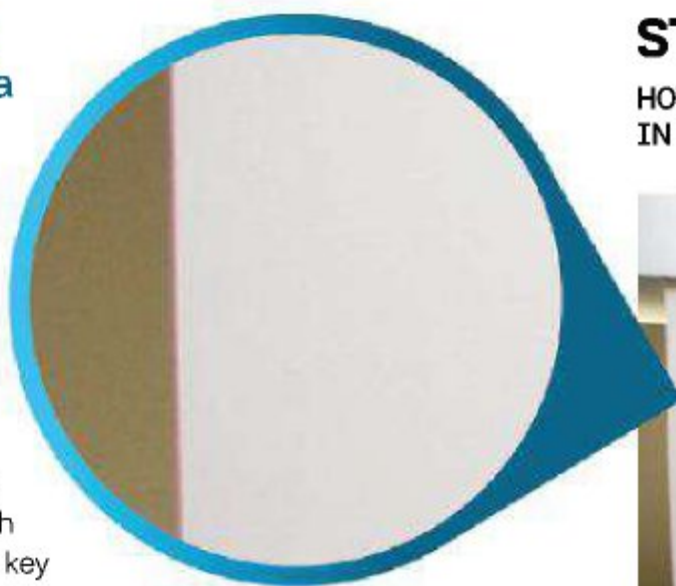
A The photographic backplate. The camera lens used has created chromatic aberration. This results in a magenta glow on the left edge of the pillar, cyan on the right

B The same chromatic aberration, replicated on a simple rendered 3D object

C Applying edge blur (most visible at the top of the torus) helps the object blend in

D The final composite image. Dodging highlights in by hand (seen in action along the upper surfaces of the torus) further helps the effect

Further reference

SELECTED FREE ONLINE RESOURCES TO HELP IMPROVE THE TECHNICAL QUALITY OF YOUR RENDERS

mental ray
> Zap Andersson's blog
  mentalraytips.blogspot.com

> Jamie Cardoso's blog
  jamiecardoso-mentalray.
  blogspot.com

> David 'DJX' Johnson's blog
  djx.com.au

> Jeff Patton's blog
  mrmaterials.com

V-Ray
> VRay.info
  vray.info

> Matt Guetta's blog
  mattguetta.com

Maxwell Render
Many concepts apply equally to other unbiased engines
> THINK!
  think.maxwellrender.com

RenderMan
> RenderMania
  rendermania.com

General information
Most developers' websites include training content for their software, while CG news sites such as CGSociety, 3DTotal and Max Underground frequently post links to rendering tutorials. And don't forget 3D World's own site:
3dworldmag.com

3D WORLD

Next Issue

BLENDER TIPS • BATTLE: LA

Don't miss our power tips for Blender, and go behind the scenes on Battle: LA!

▶ Scott Spencer shows you how to sculpt and paint this demonic bust in ZBrush

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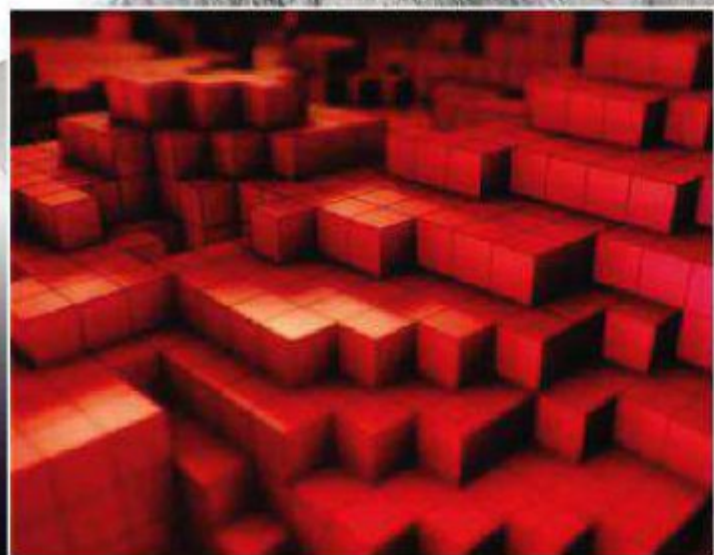
Questions & Answers
Cubist sculpture in LightWave, plus 3ds Max, After Effects, Photoshop, Maya and more...
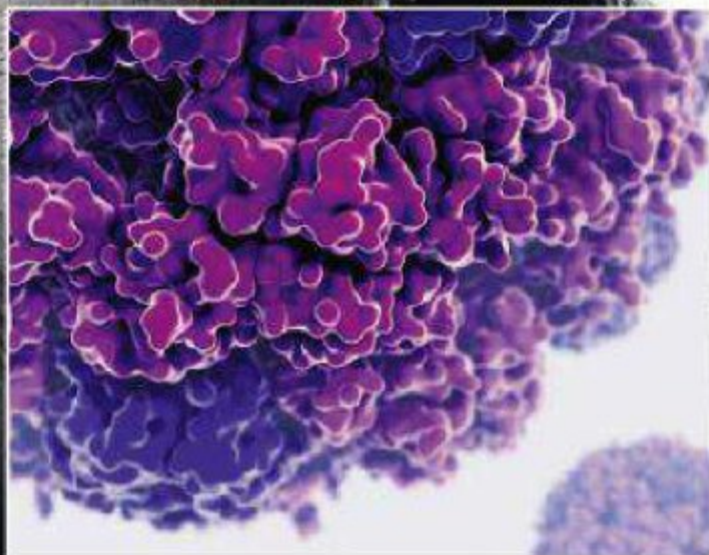
Scientific visualisation in Maya
Eric Keller describes the creation of a scientific animation using the mMaya Toolkit

Portfolio: In Focus
We dissect Ioannis Karathomas' stunning fan-art homage to the Gundam universe

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3D WORLD

Showcase
The month's best new commercial 3D projects

▼ **Project:** Emergen-C
Studio: SupamonkS

The brief for creating a new CG animated spot for US dietary supplement brand Emergen-C was given to Paris-based agency SupamonkS. Producer Cedric Ih and his team were in charge of all the 3D elements, styling and composition for the project. "This job has been a great challenge for us, and has brought us to a higher level in our production," says Ih.

The studio used Maya for the entire spot, making good use of its scripting tools to automate actions and speed up the pipeline. Challenges included creating realistic lighting and human skin so that it didn't look cold and plastic, as is often the case with CG characters. They managed to overcome both issues using mental ray. "The physical lights and shaders of mental ray, as well as the possibility to output frame buffers, are very useful for composition," says render TD Lam Le Thanh.
supamonks.com

A charming family-oriented tale pushed SupamonkS to new technical heights for the Emergen-C spot

Projects

This month's round-up of new commercial work includes a high-energy sports promo and an unusual focus group

▲ Project: Kit Kat

Studio: **Framestore London**

The London studio of Framestore has just completed the latest ad for the long-running 'Have a Break' Kit Kat spots, featuring CG construction machinery. The live action was shot on a building site in London that already included cranes and wrecking balls. However, Framestore decided to recreate them in Maya using client ideas and Flickr images as reference material. This provided the director, Steve Cope of Rattling Stick, with more opportunities for movement to choreograph the sequence. CG versions meant that they were able to make subtle adjustments to ensure believability.

"We used mental ray's mia_material for our shader and hand-keyed wave deformers in Maya to animate the ripples up the chain," explains the spot's lead CG artist, David Fish. The real actors who feature in the ad were shot against greenscreen, then composited into the live action and CG plates to bring it all together.

framestore.com
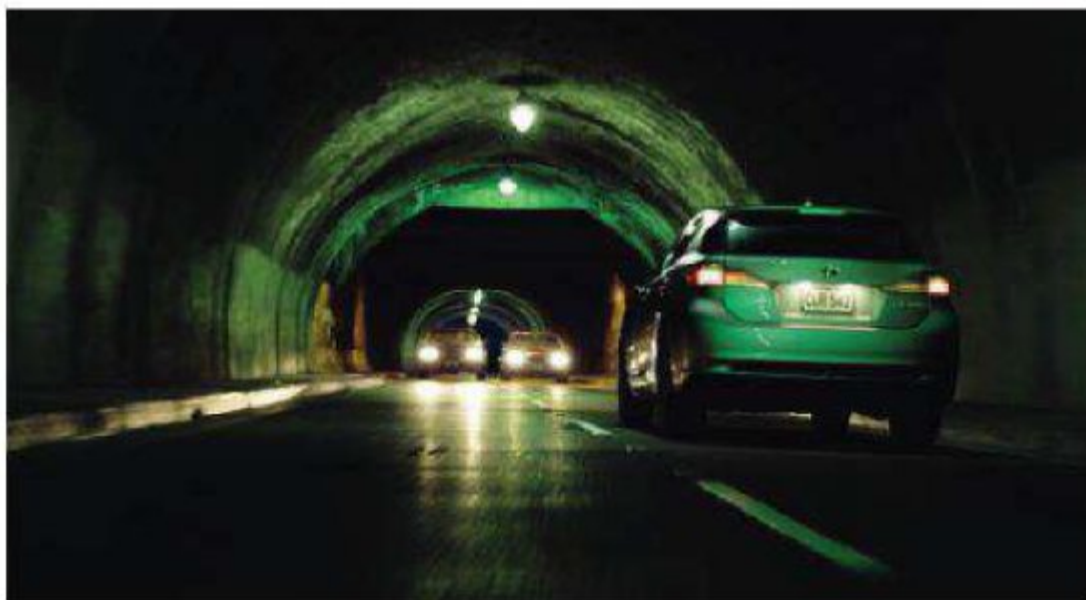
◄ **Project:** Lexus Dark Ride
Studio: Speedshape

Lexus Dark Ride is a twelve-and-a-half-minute interactive action film, created using 3ds Max and V-Ray, which recently received the FWA People's Choice Award. In collaboration with Stink Digital, DinahMoe and NYC-based agency Skinny, Speedshape worked tirelessly on the post-production process, with the studio creating 186 VFX shots in just eight weeks. They included full exterior vehicle replacement and 210° field-of-view interior compositing to enhance the interactive element – a pretty massive job, when you consider the length of the film and the fact that every shot featuring the Lexus CT200 is CG.

Speedshape's crew included head compositor Ryan Trippensee and VFX supervisor Connor Meechan. "I'm proud of what our team accomplished on Dark Ride," says Meechan. "We really put our bulletproof pipeline to the test, and were able to develop some new tools and techniques to push the interactive experience and level of quality another notch forward."
speedshape.com
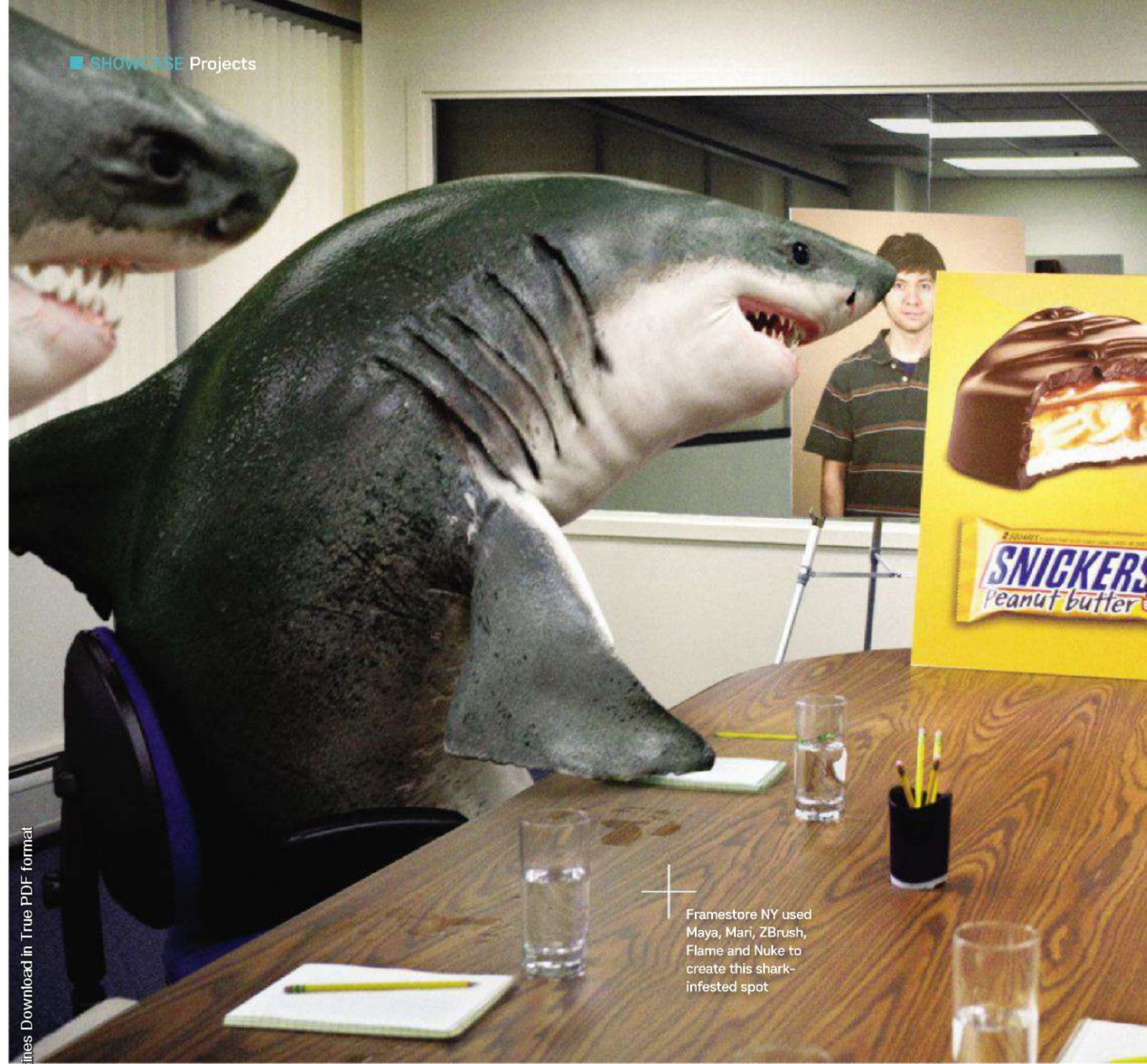
Framestore NY used Maya, Mari, ZBrush, Flame and Nuke to create this shark-infested spot

▾ Framestore composited the sharks into live-action footage of a Snickers focus group
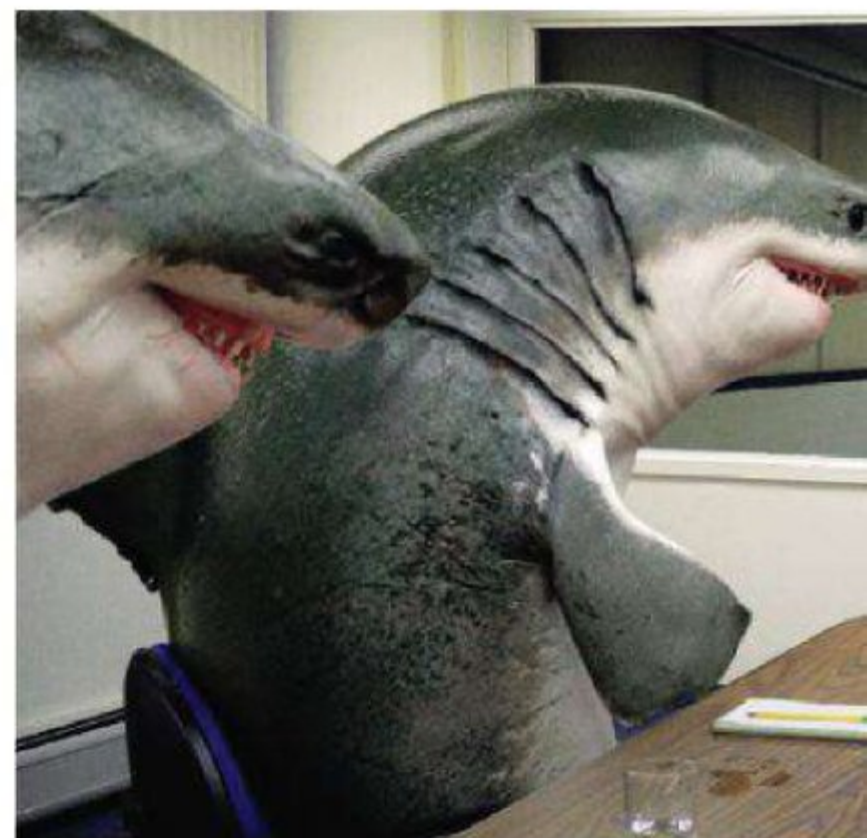
> ❝ When we saw the script, we knew this was going to be perfect for us – good comedy with photoreal creatures ❞
>
> JAMES RAZZALL, FRAMESTORE

■ **Project:** Snickers Focus Group
Studio: Framestore NY

The crew at Framestore's studio in New York created the five photorealistic CG sharks that feature in this spot for Snickers Peanut Butter Squared. Directed by Jim Jenkins of O Positive, the focus group was filmed using real actors, and the footage passed on to the studio where Framestore composited the sharks into live-action plates. Having worked on countless sea creatures in its history, Framestore already held an extensive amount of research on skin types and textures – although that didn't stop VFX supervisor Ben Cronin and CG lead James Dick from bringing in a live dogfish to study on set.

"The BBDO [advertising agency] guys, Jim and the Snickers clients all had the same vision for how real the sharks should look," says executive producer James Razzall. "When we saw the script, we knew this was going to be perfect for us. Good comedy with photoreal creatures in a live-action environment: right up our street."

framestore.com/ny

▶ Project: **Welsh Rugby Union**
Studio: **Mainframe**

At the end of 2010, Mainframe secured the job of providing all commercials and match day big-screen content for the Welsh Rugby Union and Millennium Stadium. Spreading the workload between its London and Manchester offices, the studio was responsible for all the design, direction, animation and VFX on this project. Maya, Nuke and After Effects were used in its creation.

The WRU spot features a complex particle system that fuses together to form the shape of a rugby player, who runs the length of the pitch and scores a try. It uses motion capture data recorded at Centroid's Pinewood Studio. The dynamic ending sees the particles break apart to form the Rugby Union logo. Mainframe's Adam Jenns explains: "The resulting work is a high-energy, emotionally charged piece designed to stir the national pride so deep-rooted in Welsh rugby fans."
mainframe.co.uk
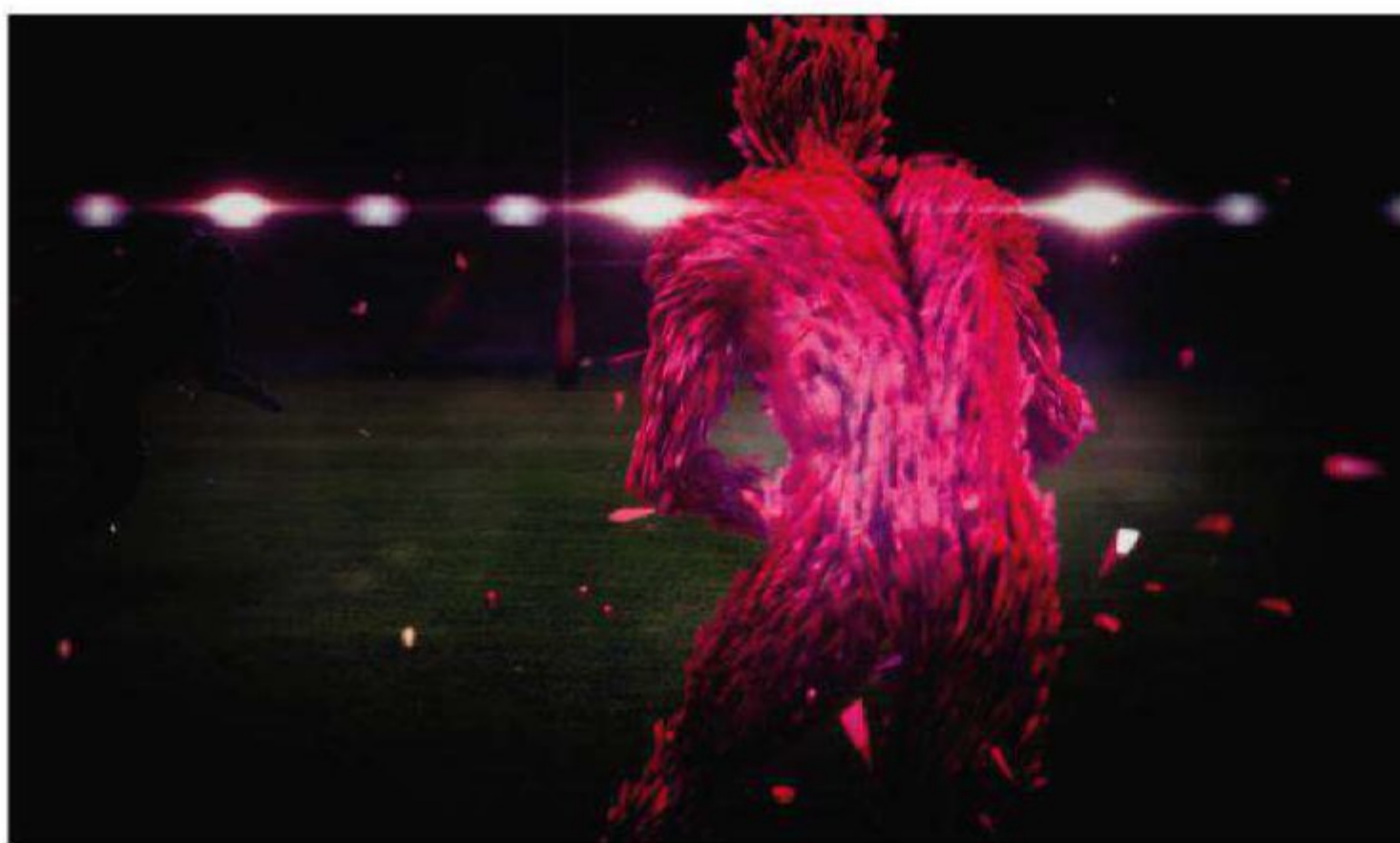
❝ It's a high-energy, emotionally charged piece designed to stir the national pride so deep-rooted in Welsh rugby fans ❞
ADAM JENNS, MAINFRAME

■ **Project:** Subaru
Studio: Air CGI

Air CGI was commissioned to create the CG section of this spot. It features a full CG version of Subaru's Outback car driving through a CG snow environment, edited together with live-action footage. During preproduction, the studio brought in automotive photographer Harniman to produce a realistic HDR light setup, while it tackled compositions, camera angles and animation over the terrain.

The environment proved tricky because the car needed to leave tyre marks in the snow. An image of the terrain and animated tyre tracks were combined in After Effects to produced a high-res displacement map, which was applied in V-Ray to achieve the complicated but realistic-looking animation. The effect of snow coming off the tyres was achieved using multiple particle systems.
air-cgi.com

Submit a project

If you would like to see your studio's work featured in these pages, email us at the address below, including brief technical details and at least three print-resolution stills. Please note that we can only feature commercial projects released to the public within the last few months.
enquiries@3dworldmag.com

3D WORLD Training

070

DoubleHelix's Chad Morgan presents a professional rig solution for animators

076

080

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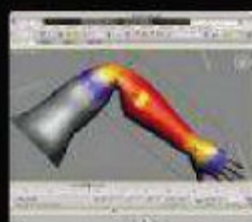
3ds Max   Cinema 4D   Gimp   Maya   modo   Photoshop   Softimage   Unity

**Video guide
Maya
Animation**

FOR
Maya (all versions)

TIME TAKEN
Two hours

TOPICS COVERED
• Character rigging
• IK systems
• MEL scripting

ON THE DISC
• Scene files
• MEL scripts
• Screenshots

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• Video tutorial
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About the author
Chad Robert Morgan is the senior technical artist for Double Helix Games, where he's responsible for character rigging, tool development, export pipelines and training. Previous projects include Front Mission: Evolved and Silent Hill: Homecoming
doublehelixgames.com

The model in this render was created by Mayan Escalente (mayanescalente. com); the render itself is by Don Waters (donwatersart.com)

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this rig with Chad Robert Morgan's
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Create a versatile character rig

Take control of your animation as **Chad Robert Morgan** helps you build a switchable rig capable of quickly and easily adapting to your needs

One of the first tasks that was assigned to me when I came to work at Double Helix (or The Collective as it was then) was to create an IK/FK switching system "similar to what's in Max and Biped." Since then, I've seen several solutions published, but the solution we came up with then – with some additional features here and there – is still used in production today at Double Helix, including on our latest project Green Lantern: Rise of the Manhunters. The nice part about this system is that it's almost all MEL script, so it's customisable to suit your individual needs. I'll show some examples of where we've done just that.

Just as I did when I sat down to solve this problem, the first thing you'll do is analyse the issue. Once you have a good understanding of how IK in Maya works, I'll show you the small additions you can add to the rig to support switching between Inverse Kinematics and Forward Kinematics, followed by the MEL code. Then I'll discuss some of the embellishments I've added to the code to support the more distinctive aspects of our rigs, as well as how to trigger the switching automatically with a script job.

The bulk of the work is done by the MEL script. We did our best to keep the script clean and generic, and even though a few hacks crept in over the years it's served us well in five projects over as many years. Animators have come to depend on it as a vital tool for getting good animations quickly, and its versatility has been incredible. I'm sure you'll find ways to make this tool even better.

My thanks to the animators at Double Helix both past and present, whose demand for quality pushed me to be a better character TD, and thanks to Double Helix for allowing me to publish this tutorial and the MEL scripts on the disc. »

The third joint isn't part of the IK system: it's needed to create the IK handle, then links to the end effector

■ Video 1 00:07:43
This joint set-up uses Maya's standard IK/FK system. It doesn't take long to see how easily it can break under real-world conditions

■ Video 2 00:04:50
When you're dealing with character or creature limbs, a Rotation Plane solver is the best option as long as you understand its principles

How to use this tutorial

First, visit 3dworldmag.com/141, where you'll find details of the screen-capture videos that accompany this tutorial. The videos are also available at youtube.com/3dworld. Use the video player's controls to skip to a timecode listed in the text, read the overview, then play the footage.

Video 1

Defining the problem

Doesn't Maya already have IK/FK switching built in? Well, yes and no. In this first video, we'll look at the different types of IK solvers in Maya and how they work… and how they break.

▶ Video 1 02:04
Two-bone example

Open simpleIKIssues.ma from this tutorial's project files. Here we have a simple two-bone system with an RP IK handle. There are two joints that you can identify by their brown colour. The last joint isn't effected by the IK solver: it's there only to generate the end effector when you create the IK system.

⏸ Video 1 03:44
Breaking IK/FK switching

If you grab the IK handle, the joints move; and if you grab the joint and rotate it, the IK handle comes

along for the ride. In short, this is exactly how you should want an IK/FK system to work. So what's the problem?

Grab the poleVectorControl locator and the IK handle, then select Constraint > Pole Vector. Now try to control your arm like you did before. You'll see the FK will not work while the IK is on like it did before: the pole vector constraint prevents the IK/FK system from working.

You can use the Twist value on the IK handle, but it's possible in FK to move it back to its initial pose without your Twist value updating, which can cause problems for your animation.

⏸ Video 1 07:43
Problems with parenting

Another problem with Maya's IK/FK system is seen when you parent the IK handle to the other locator, ikParent. Try rotating the joint now. With the IK handle on and parented to the locator, it's locked again. Next, undo that parenting, then select and group everything. Once again, the IK/FK switching doesn't work any more.

Videos 2-3

How IK systems work in Maya

After seeing what the problem is, let's now take a closer look at how IK systems in Maya work, and how the IK solvers included in the package differ from each other.

▶ Video 2 00:05
Different types of solvers

There are basically three IK solvers that come with Maya: the Single Chain (SC) solver, the Spline IK solver and the Rotation Plane (RP) solver. For things like arms and legs, the best solution is the RP solver. RP solvers can work with pole vectors where SC and spline handles cannot.

⏸ Video 2 04:50
Defining an RP solver

As you might remember from high school geometry, it takes three points to define a plane. (In this case, you actually need more than that, but I'll talk about that in a second.) The start and end joint define two of them.

The third point is defined by the Rotation Disc, which is the brown circle with the white arrow at the start joint. That white arrow aims at your third point: when you use a pole vector constraint, the white arrow points to the object you're constraining it to. If you edit the Twist value, you're rotating the arrow around that disc.

⏸ Video 3 00:17
Best use of RP solvers

To get the best results from an RP handle, you have to obey a couple of rules. RP handles want all the joints to be in a plane. (It's right there in the name.) The orientation of the joints is vital to determining the plane. In the case of your IK handle, you don't need three points to define the plane – you need three vectors.

An easy way to see if your joints aren't in the same plane is to check the children of your start joint. If the joint has translation somewhere other than the down-the-joint axis, its vector is not in a plane.

Lastly, the RP handle will want to rotate the middle joint in one axis only, in order to keep it in the plane; so if that middle joint is cocked at an odd angle, even if its rotations are zeroed out, you can run into problems. Make sure your joint orient is clean and only has rotations in the bend axis.

■ Video 3 00:00:17
RP stands for Rotation Plane. An end effector marks one point, a start joint the second. A pole vector can be used for the third point

■ Video 5 00:00:05
Your script needs a reliable way to be able to match the markers to the correct controls

Videos 4-6

Setting up the rig

Now that you have a better understanding of how the IK system works, you can come up with a solution. You basically have two problems that need solving: you need to be able to switch from IK to FK, which is easy; and you need to be able to switch from FK to IK, which is trickier.

Most of this will be fixed in MEL, but you'll first have to do a couple of things to the rig to make that task a bit easier. You'll start with a simple two-joint system as you get the hang of the principles, so open simpleIKwithPoleVector.ma from the project files to continue.

▶ Video 4 00:05
IK markers

Switching from IK to FK is easy: store the rotation of the joints, turn off the IK and reset the FK joints. Switching from FK to IK is trickier. You need to know where to move your IK controller, how to orient it and where to put the pole vector control. Only then can you turn the IK on.

The position of the IK controller should be easy. The system has to be flexible enough to handle both IK handles and controllers. The solution is to come up with an IKSwitchMarker. The IKSwitchMarker can be anything, really, but at the default pose it has to have the same position and orientation in world space as your IK control.

We will need to do the same for the pole vector controller. You'll create a poleVectorMarker to differentiate it from the IKSwitchMarker. After looking at how the Rotation Plane solver works, it should be pretty clear that the marker for the pole vector control should go under the start joint. After all, all the middle joint does is bend in one axis, all the other rotations comes from the start joint.

You also need to turn off the ikBlend for the IK handle. We're going to make the assumption that the attribute will always be called ikBlend. In the case of a controller driving an IK handle, you need to make sure that the attribute controlling the ikBlend on the IK handles is also called IK Blend.

▐▌ Video 5 00:05
Message attributes

The script will have to be able to find the markers and match it to the proper control, so we need to think on how that will work. We could do it based on the name, but that's easy to break. The better way is to connect them with a message attribute.

Message attributes are used all the time in Maya, but they're kind of hidden. If you select Modify > Add Attribute, you won't see an option in the subsequent dialog for creating a message attribute. You'll have to add the attribute via MEL instead.

For the ikSwitchMarker, the MEL command is addAttr -at "message" -sn "ikm" -ln "ikSwitchMarker". For the poleVectorMarker, the

command is similar: addAttr -at "message" -sn "pvm" -ln "poleVectorMarker".

▐▌ Video 6 00:05
Automating the markers

Included in the DoubleHelix_IkFkSwitch script in the project files are several MEL procedures that automate the creation of IKSwitchMarkers and PoleVectorMarkers, including adding the message attribute to connect the control to the marker. The DoubleHelix_SetUpPoleVectorMarker proc automates the creation of your pole vector marker. It takes the name of the pole vector control as a parameter. The DoubleHelix_CreateIkControlMarker proc takes the IK control and a matching FK control as parameters. »
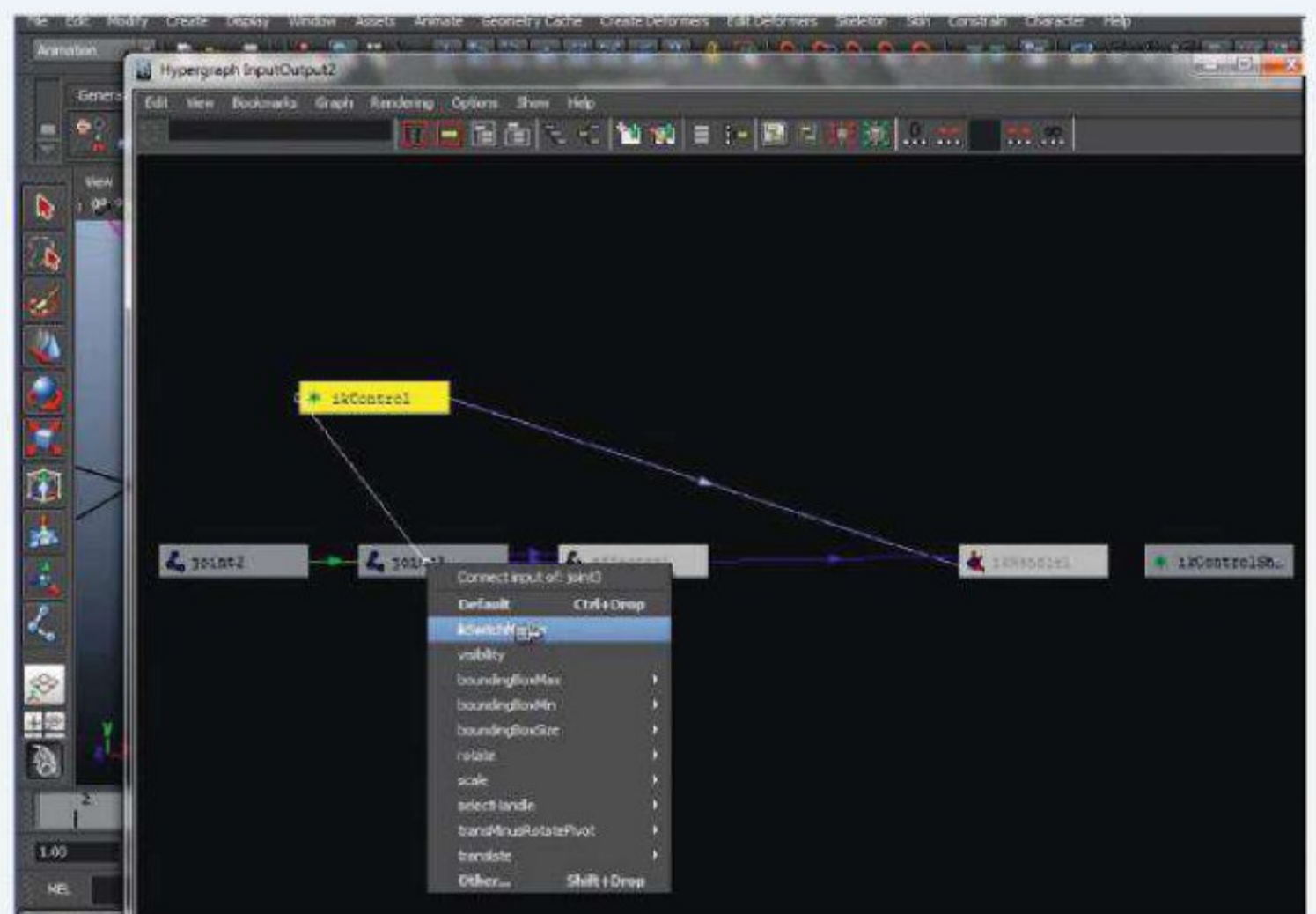
■ Video 5 00:04:07
Message attributes enable you to connect and establish relationships between objects
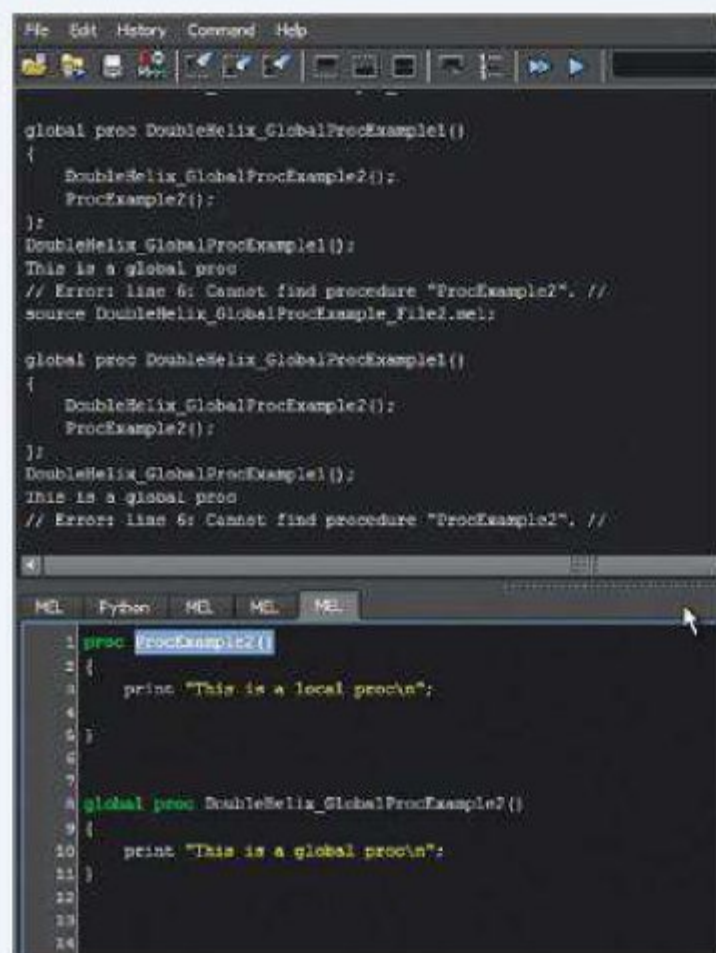
Video 7 00:03:10
When called from the other MEL script the global procedure works fine, but the local procedure cannot be seen from outside its own script
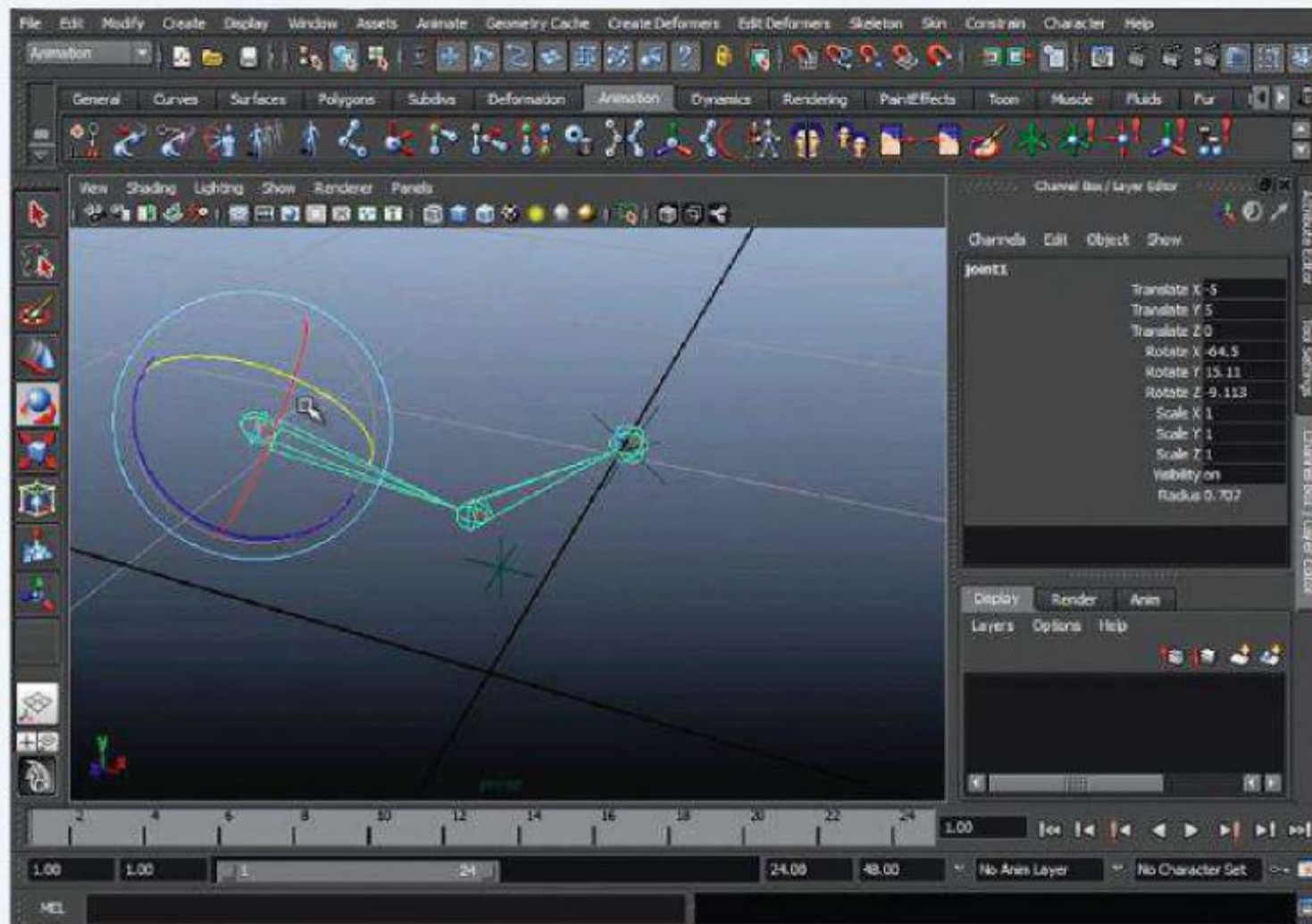
Video 9 00:04:51
Applying the IK/FK script means that your two-joint rig now works in a more predictable way

Videos 7-9

Writing the MEL
Reading through MEL code can be dry, but I'll try to make this walk-through as interesting as possible. I won't step through the code line-by-line – you have the script in its entirety to review at your own pace. Here, I'll just briefly describe the basic principles; on the video, I give an overview of the individual procedures.

▶ Video 7 03:10
Local vs global procedures
The MEL scripting language doesn't have object-oriented abilities like C++ does, but it does have local and global procedures. One mistake I see a lot is people making all their procedures global. This pollutes your global space, and all those procedures stick around until Maya is restarted. The more procedures you have in your global space, the more likely you are to have a conflict.

Your global functions should act as your entry into a script: they act like what object-orientated programmers call public functions, becoming

available for access from other scripts. Local procedures can only be able to be called upon within the individual MEL script in which they appear, so they act like private functions.

To continue, copy the two MEL files DoubleHelix_GlobalProcExample_File1.mel and DoubleHelix_GlobalProcExample_File2.mel from the project files into your scripts directory. Source DoubleHelix_GlobalProcExample_File1.mel and run the proc DoubleHelix_GlobalProcExample_Example1.mel. You should get an error message saying it can't find procedure ProcExample2: that's because it's a local proc in DoubleHelix_GlobalProcExample_File2.mel.

Modify DoubleHelix_GlobalProcExample_File2.mel to add a call to ProcExample2 from the global proc, and remove the call from DoubleHelix_GlobalProcExample_Example1.mel, then save and re-run the script. It should work fine now. A global procedure can talk to global procedures only when they're in other scripts, but it can talk to local procedures in its own file.

▌▌ Video 8 00:05
Stepping through the code
This part of the video is but a quick overview of what the script is doing, procedure by procedure. I encourage you to study the script in its entirety at your leisure. There are a couple of places where you have code to handle things I haven't discussed yet. Ignore these for now – they will make more sense as we move forward.

The code is broken into sections. Section 1 holds low-level procedures that do some basic functions. Section 2 holds the set-up functions for creating the ikSwitchMarkers and poleVectorMarkers. Section 3 handles the actual IK/FK switching, while the last section includes a few procedures for setting up a script job.

IKFKSwitch script and source it. Middle-mouse-drag DoubleHelix_IKFKSwitch() to your shelf for an easy temp button. The arm is in IK at present. Grab your IK controls and pose the arm. Select your IK controller and click the button. You should know be in FK.

Rotate your arm in FK. You can rotate the first and last joint any way you want, but remember that the IK will only want to bend the middle joint in one axis. If you rotate it on any other axis but Y, the IK system will have a hard time matching. I've left it unlocked in the scene file so you can play with it and see the problems, but you can lock off the X and Z axis if you like. The script is smart enough to handle that. I usually leave them unlocked in case the animator has to do some crazy animation, like the character's arm getting broken in an accident.

▌▌ Video 9 06:04
Script job
So far, this isn't exactly the "just like 3ds Max" feeling we were shooting for: in 3ds Max, this switching would be automatic. This can be done with the addition of a script job.

You can create a global variable to keep track of the script job, which makes it a lot easier to kill it if
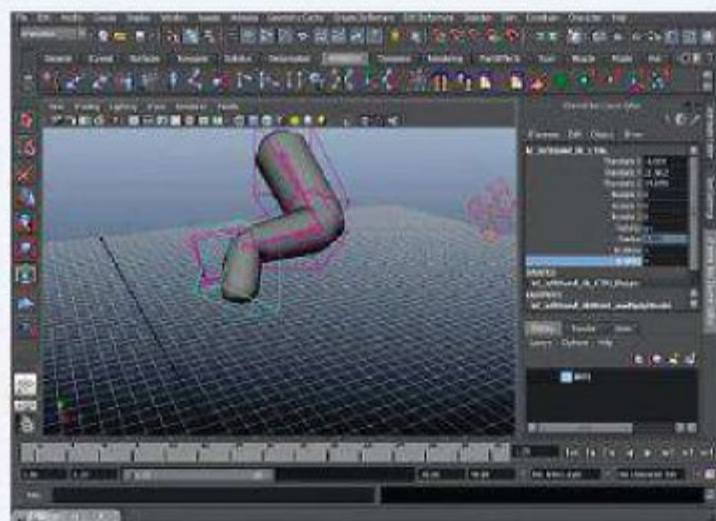
Video 10 00:02:44
The wrist can be controlled by either the FK or IK control while in IK. The script will need to handle this addition to the rig

▌▌ Video 9 04:51
Running the script
If you don't still have simpleIKwithPoleVector.ma open, re-open it now. Load up the DoubleHelix_
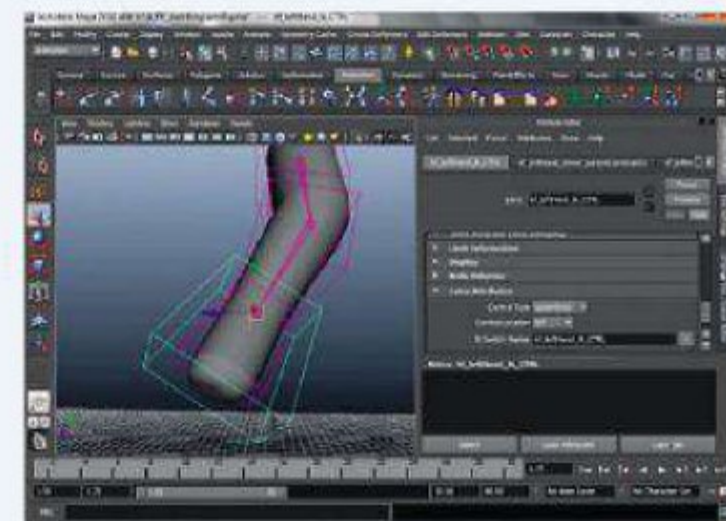
Video 10 00:05:47
This wrist rig shows how it's possible to customise the rig, in this case adding the option to control the IK rig with the FK controls

The IK controller has an Ankle attribute that moves the middle segment. You need to calculate what the ankle value should be while in FK

■ Video 12 00:00:05
In a more complex rig like an ankle joint, switch drivers can help to automate the transfer from FK to IK

you need to. Script jobs are basically little scripts that monitor Maya for a specified condition or event, then respond by triggering a specified procedure – in this case, the DoubleHelix_IKFKSwitch().

Video 10

Embellishing the script

Now that you have a basic understanding of how the script works, let's look at some of the embellishments that have been added over the years. The beauty of doing it all in script is that if there is a change that needs to be made or additional functionality needed, you just add it to the script. The first change we added was to incorporate the ability to animate the hand with either the IK or the FK control while in IK.

▶ Video 10 01:37
IK/FK wrist

Load up armRig.ma: this is our basic arm rig that we use at DoubleHelix Games. There are two sets of joints included: the FK controls and the actual bind. The ikWrist attribute on the IK control drives the switch from IK wrist to FK wrist when IK Blend is set to 1. Controlling the hand's rotation as well as the IK from the same control is convenient, but prone to gimbal lock. Being able to switch to FK can help in those situations.

⏸ Video 10 05:47
UpdateFKWrist

Having that attribute in place is the only condition needed to call the UpdateFKWrist procedure. The procedure makes two assumptions: that the FK control serves as the ikSwitchMarker, and that the attribute controlling it is called ikWrist.

Videos 11-12

Multi-bone rigs

You've seen the IK/FK switching working for simple two-bone chains. In this last section, I'll show how we've extended the functionality to handle more complex rigs. The following example is indicative of one we've seen in various projects here at Double Helix, from Silent Hill: Homecoming to GI Joe: The Rise of Cobra and lately Front Mission: Evolved. In this example, you'll see what those drivers that we mentioned in the script were all about.

▶ Video 11 00:05
Three-bone rig

Open complexExample.ma. It's a more complex example of an IK set-up that you won't see in a standard biped. How we set up the rig is beyond the scope of this guide: the important thing is how we modified the IK/FK switch to handle it.

In complexExample.ma, you have a three-bone rig. ikControl moves the leg; it also has an Ankle attribute that gives additional control of the lower part of the rig. The problem this presented, however, was that our IK/FK switch had no mechanism for these additional attributes. We could switch from IK to FK with no problem, but since the IK system depended on the Ankle attribute to be set correctly as well as having the controls in the correct place, switching from FK to IK was unreliable. To fix this problem, we came up with the idea of switch drivers.

▶ Video 12 00:05
Switch drivers

We kept the system as generic as possible. The way it works is that there's an attribute called X_switchDriver on the IK control, where X is the name

of the attribute you wish to update. In this case, the attribute is ankle_switchDriver. Now all you have to do to have a correct switch is make sure ankle_switchDriver holds the value you need Ankle to be.

So how do you make sure the switchDriver attribute is the correct value? Well, that's up to the character TD. Every situation is going to be different, of course, but I can tell you how we set up the ankle_switchDriver as an example.

The first thing you need to understand is that the Ankle attribute is plugged directly into the Z Rotate of the ankle pivot. upperIKHandle is a child of this node, so as the Ankle attribute is rotated, the inner part of the leg moves forward and backwards. The ankle pivot is a child of the IK plane driver, which is a child of the IK control.

So in this case, the solution was easy – a simple single-chain IK system that points back up to the middle joint. This way, the single-chain system simulates the motion of the ankle pivot procedurally. You can test it: move the Ankle attribute, and you should see ankle_switchAttribute update and have the same value. Try switching back and forth – no matter how you set the FK system, the IK system should be able to match it. ●

▶ When you're pitching to a client, a good pose can make or break an idea
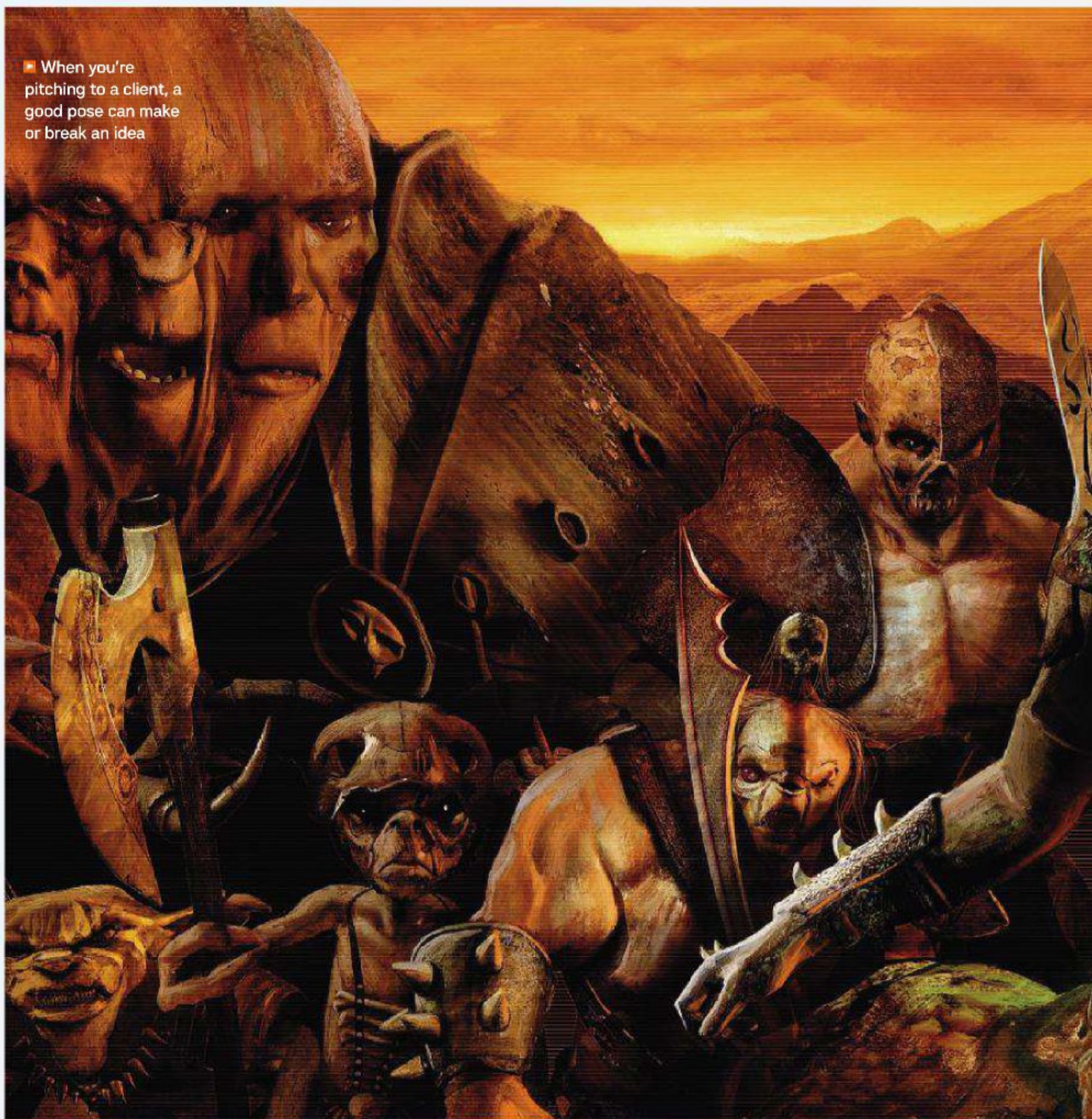
Create dynamic character poses

Inject life into your figures as **Brian Haberlin** reveals ten ways to take your poses from stiff to supple

About the author
Brian Haberlin is an illustrator and comic book artist. He teaches at Minneapolis College of Art and Design, and produces tutorial downloads
digitalarttutorials.com

Y ou've made the coolest new character ever. You show it to your director or client – and they just yawn. The chances are that it wasn't the fault of your design, sculpt or paint job, but your pose. A T-pose just doesn't cut it these days.

Think of your pose as a way to sell your idea. If it didn't matter, you'd have mannequins, not models, on fashion show runways. I've had the benefit of working alongside some of the most talented illustrators around; folks who make the still image dynamic and interesting. It's easy to catch the eye with something animated, but when you can make a still feel alive, then you've got something. Here, I'm going to cover topics that will help you make your images and animations feel dynamic. Some things you'll know, some you'll need reminding of and some should be new – so let's get to it.

PI
GOBLIN

AINC
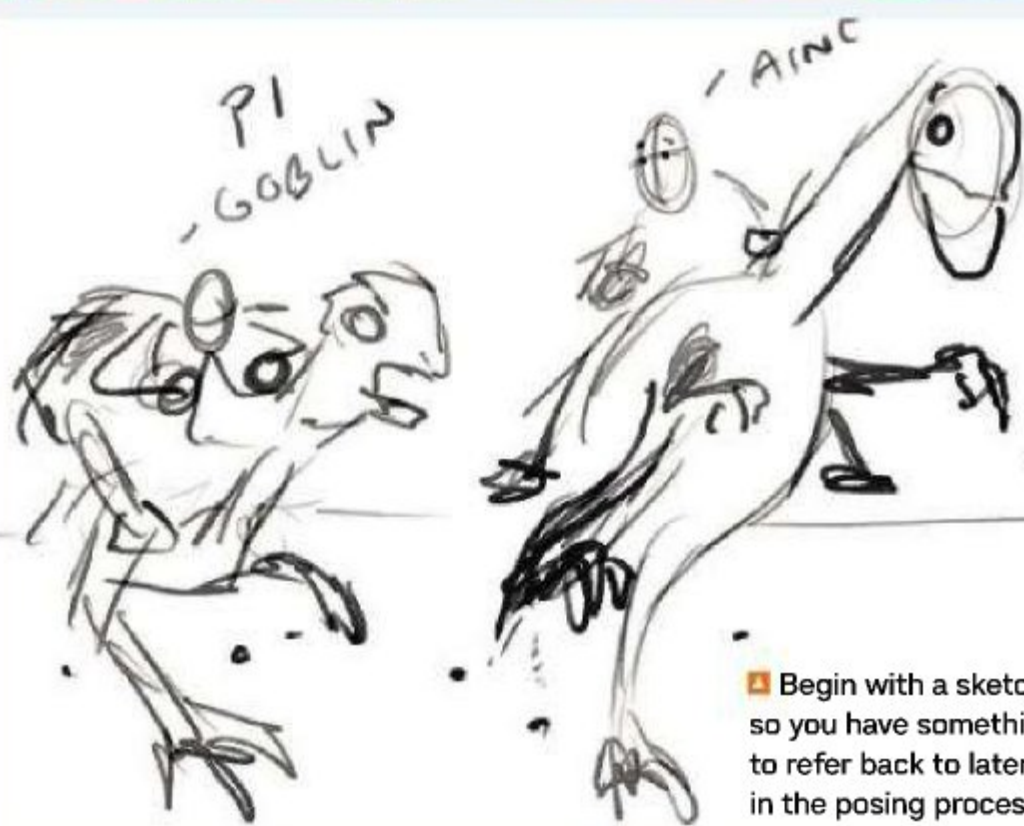
■ Begin with a sketch so you have something to refer back to later on in the posing process

01 Start with the sketch

A big mistake is to just jump in with your program of choice and start posing away. Begin with a series of loose sketches of your pose. A gesture sketch is always going to have more energy than any fully rendered image, and you want to tap into that. You don't need to do anything elaborate – in fact, the looser the sketch is, the better. Then use that as your road map, and use 3D for what it's good for: playing with the camera angle and position to add even more interest and dynamism.

If your final pose is stiff, look back at your initial sketch. You're sure to find something that you missed and can quickly fix. At the same time, make sure your hands aren't tied by the sketch: if something works better in your final pose, go with it.

»

■ When posing numerous figures, take depth into account. Ensure your scene has a clear foreground, middle-ground and background

02 Foreground, middle-ground and background

Think about having a clear foreground, middle-ground and background in your image. This is more important when posing multiple figures or scenes. Disney animators learned this principle decades ago, and it got a fresh coat of paint with the Deep Canvas system adopted for the Tarzan animated film. Don't be shy about your separation of depth planes: if you're mild with it, you might as well not use it at all.

Really bring something close up as a foreground element; let it crop. You can use depth of field to push the effect. Another way to emphasise the look is with atmosphere: let the distance objects be affected by haze, shafts of light, snow, or flying dirt or smoke.
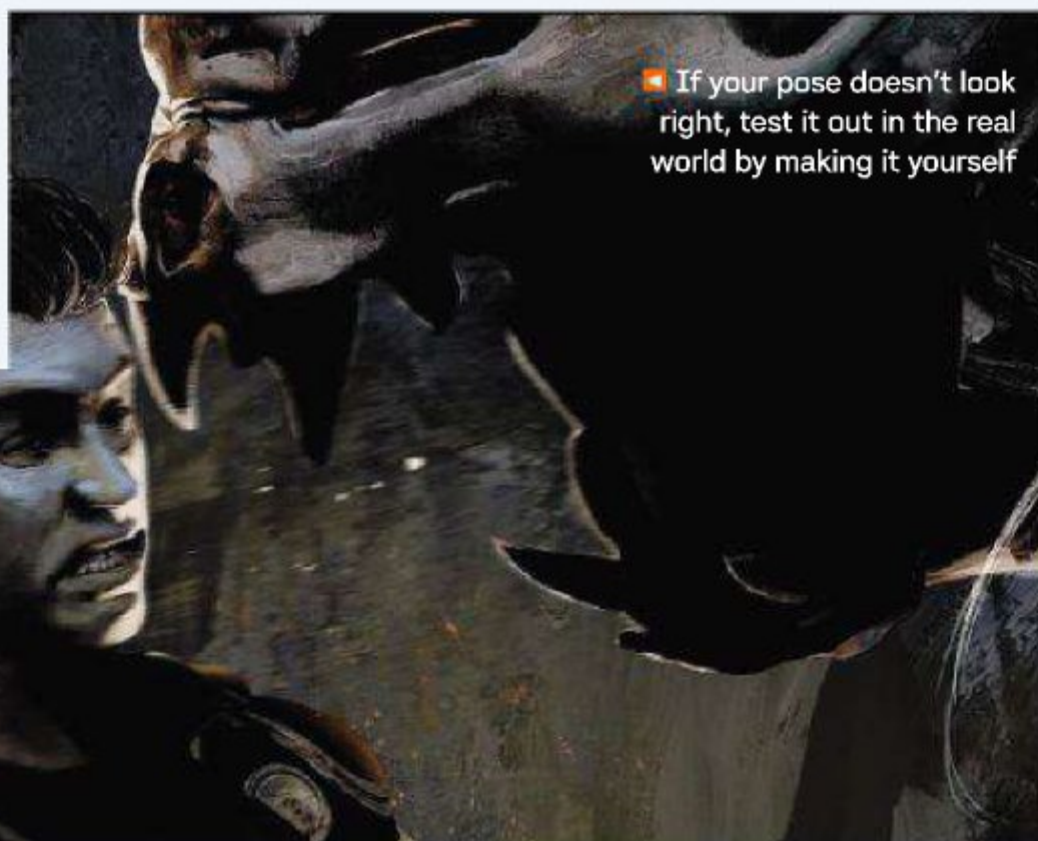
■ If your pose doesn't look right, test it out in the real world by making it yourself

04 Test the silhouette

This is an old art-school trick, but some folks think it's just for concept design now, and it really isn't. Take the pose you're working on and have your program display it in flat-shaded mode. If your pose isn't readable – meaning you can't tell what the character is supposed to be or what it's doing – change it.

03 Make the pose yourself

I'll often get a pose from someone in my studio that, while not bad, is somehow wrong. The first thing I do is ask them to act it out. Since even the best rigged model can do things real bodies can't, you must know how actual bodies behave. Is that bicep turned out too much for the rest of the arm to be posed like that? Can the thumb really rotate that way? This is often more important in relaxed poses than action shots: you need to notice, for example, that the natural pose of relaxed hands is to turn in, with the pinky being the most curled and the index finger being the least. Have a mirror by your workstation or use a webcam: these are also great for getting the nuances of facial expressions and checking animation moves.

■ Add cast shadows from your character's limbs and props to give extra visual interest

■ Adjust the camera's focal length: a lower setting can make your image feel less flat

05 Think about the shadows

Take into account where your shadows will fall in the pose. Cast shadows always add interest. If you think of your composition as forms and shapes, shadows are what define those forms and shapes. Hair casts shadows back on the face, while the sword arm casts a shadow angularly across the body.

06 Consider your frame

I have to give credit to comic-book great Todd McFarlane for teaching me this tip during my stint as his company's editor-in-chief. The vast majority of the time, you're dealing with a rectangle or square as your final presentation format: whether you're creating for the printed page or a screen, you have linear edges at the side and bottom. Don't replicate these edges in your piece!

The more you can oppose these lines in your pose, with limbs and torsos at angles to them, the more energy your piece will have. Think about these borders as design elements. Don't just place your figure smack in the middle of the frame. If you crop part of a head or body, it can become much more interesting.

07 Asymmetrical, not symmetrical

Mirrored poses are easier to do, but they're only a minor step up from a T-pose. The whole figure is your design tool, so don't slough off one whole side – that's 50 per cent of your image. The only exception to this is when you're doing something that's more like a graphic design element.
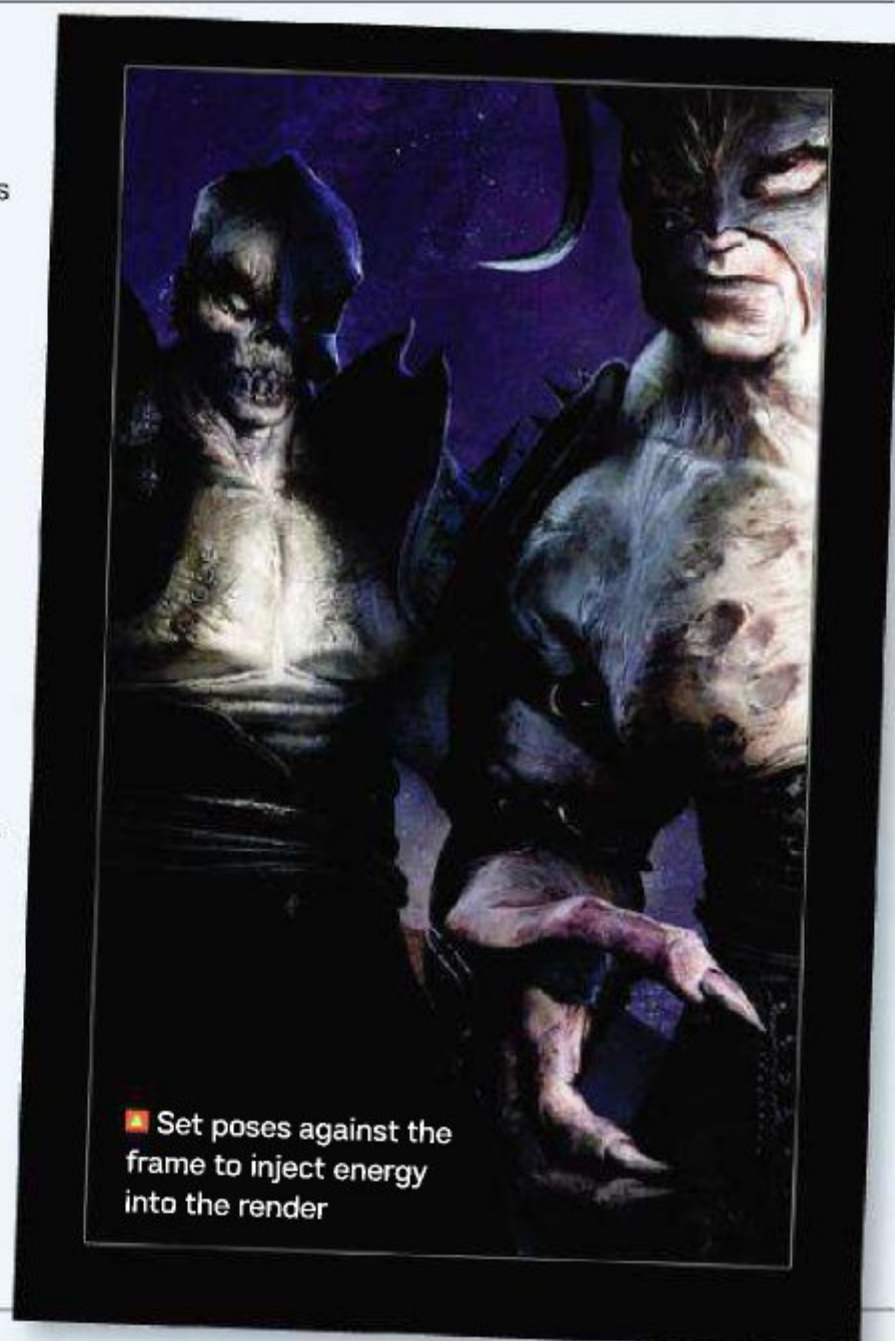
■ Set poses against the frame to inject energy into the render

08 Laws of gravity

Okay, so you've done everything we've thought about so far. The pose looks good, but there's something not quite natural about it, and you can't put your finger on what it is. There are tools in most packages – gravity, autobalance, ragdoll – that help by adding weight to the pose. Apply your tool, and you'll see that the figure's hips shift as they'd need to for the character not to fall over. They can help in making a pose look more real.

09 Cheat

We've looked at things you should do, but don't forget about the things you shouldn't – what's the point of having rules if you can't break them from time to time? Do what you must to make your pose interesting. That might mean rotating a body into a position that's not holdable in real life to suggest motion, or scaling a body part to make it longer, shorter or larger to make the pose more dynamic.

10 Focal length

You have a big, heroic character doing a big, dynamic action pose – and it just looks dead and flat. Check your camera's focal length: I bet it's high, over 70mm or so. That will flatten out the image. For action shots, try 35mm or less on your lens: it will greatly increase the dynamics by accentuating the perspective. A lens over 70mm is more appropriate for portrait shots of characters, where lens distortion isn't needed. You don't want a big nose coming right at you. ●

**Fundamentals
Any software
Lighting**

FOR
Any 3D software

TIME TAKEN
15 minutes

TOPICS COVERED
• Daylight rigs
• Night-time rigs

ON THE DISC
• Project files

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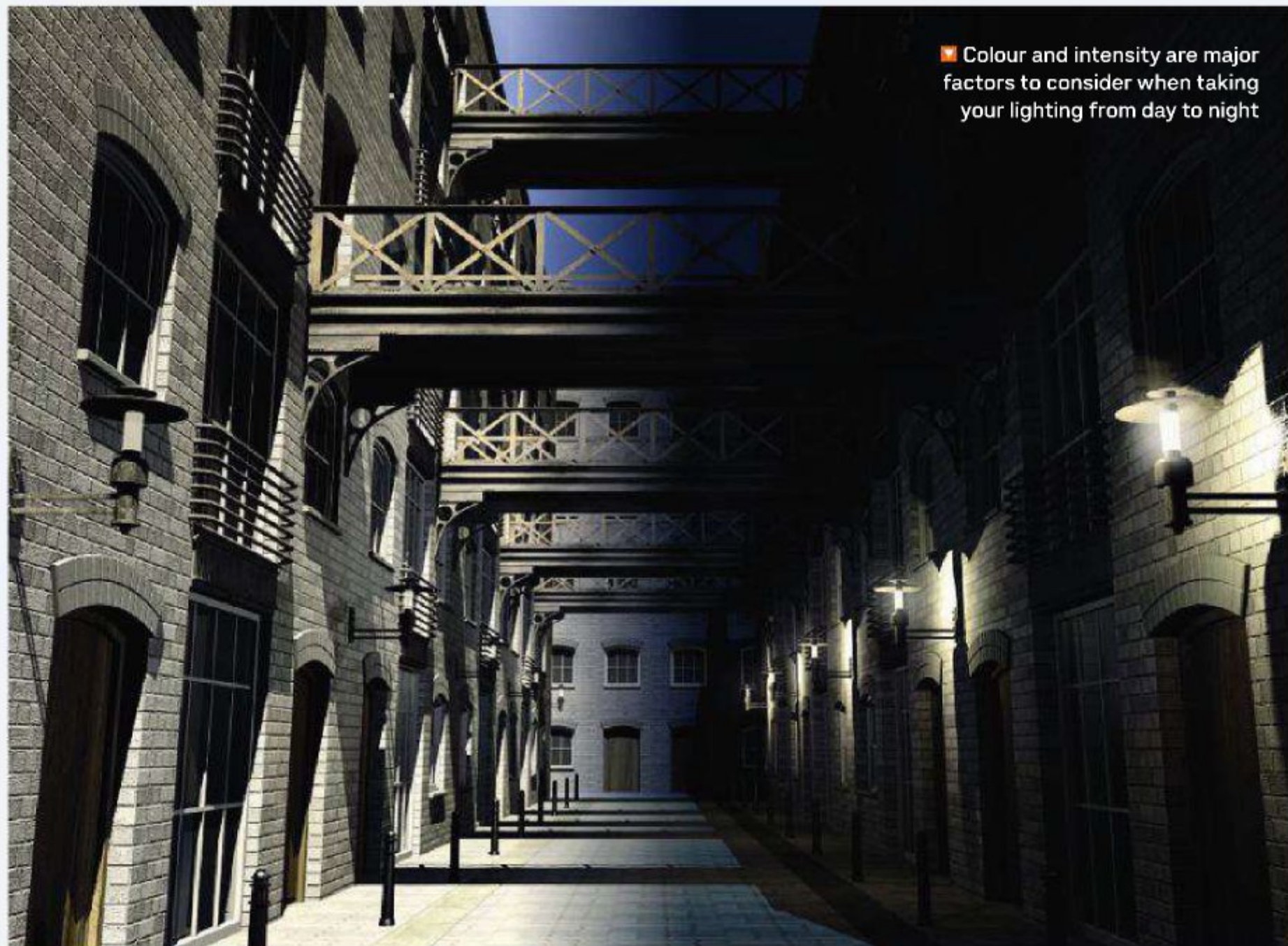
■ Colour and intensity are major factors to consider when taking your lighting from day to night

Render features 3D Alley 770 Textured by Giimann

Night and day

PART 5 Continuing his series on lighting, <u>Michael McCarthy</u> renders the same scene for daylight and night-time

Different times of day have a particular feeling associated with them. The mood and look is usually defined by the colour and the intensity of the light. A morning sunrise may have a soft pinkish hue with an increasing intensity, while a midday scene will have more direct, hard light, with a strong intensity possessing warm yellow hues. For a daytime lighting rig, you generally want to have fairly high-intensity light, with crisp shadows and a warm colour for the light. Night-time lighting rigs use cool colours with low-intensity lights.

Let's start with a daylight setup. First, position a strong direct or infinite light to emulate the sun. This will be your key light. Set your intensity high (between 1.0 and 2.0 in 3ds Max, for example) and make sure you enable shadows. For these, choose raytraced shadows to give a nice crisp edge. Create a few omni or point lights near street level to act as bounced light. These should have lower intensities. Set their colour to be slightly blue to emulate light catching some colour from stonework. Tune the attenuation for these lights and turn on shadows to add some more detail. Now tune your lights as you did in Part 4 of this series (last issue) to get a good base for a daylight scene.

When changing the scene to a night-time light rig, you want to drop the intensities of the lights and cool down the colours. To do this, set the key light to a cool blue, and bring the intensity down so that the scene is darker overall.

Next, take the bounced lights and position them in front of the street lamps. In daylight, the sun casts the most light, so the key light will be strong, and you need to use these omni lights to bounce light around. At night, the key light represents the moon, and isn't very bright. The lamps on the street contribute more light, so placing omni lights at each lamp, setting them to be brighter and giving them a warm colour is a good strategy. When you're adjusting their attenuation, try using Inverse Square Decay. It gives you more realism in the light falloff.

You can now add more bounce lights, using a low intensity and cool colour to diffuse the street lamp light in the scene. For a final touch, try adding some slight glows to the street lamp materials. This will add that little extra detail to catch the viewer's eye. When setting up a day or night scene, remember that colour plays a big part in the look and feel, making your renders richer and more believable. ●

The scene files for this tutorial include the model 3D Alley 770 Textured by Giimann, provided courtesy of TurboSquid (turbosquid.com). This model may not be used other than with this tutorial. For a commercial licence and details of other models by the artist, visit **turbosquid.com/Search/Artists/Giimann**

Next issue: Part 6
Michael shows you another great lighting technique – don't miss his video tutorial

About the author
Michael McCarthy is an accomplished 3D artist and Autodesk Certified Instructor working in broadcast, feature film and games. He gave classes at SIGGRAPH 2010 and EUE 2010 mmccarthy.com

WATCH THE VIDEO TUTORIAL
Set up daylight and night-time lighting schemes in 3ds Max with Michael's video on our website
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**Video Guide
Mudbox
Sculpture**

FOR
Mudbox 2011

TIME TAKEN
Four hours

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- Using stamps and stencils
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About the author
Craig Barr is a technical marketing specialist at Autodesk, specialising in Mudbox and Maya. He previously worked in feature film, commercial and games production. He also runs the Mudbox blog on The Area
the-area.com/blogs/craig

Create a tree troll in Mudbox

Sculpt organic and hard surfaces and paint gorgeous textures as **Craig Barr** presents a complete modelling and texturing workflow

For this tutorial, you'll explore a complete sculpting and painting workflow for a forest creature. Comprised of wood, rock and vine, this tree troll is a great chance to combine organic and hard surfaces within a single design. The videos accompanying this guide show the complete workflow; here, I pick out some of the highlights to help you use the video material more effectively.

You'll start by sculpting the primary shapes and forms of the rocks and roots, then build your way up to detailing the surface with vector displacement as well as regular stamps and stencils. You'll also work on defining structures with a variety of organic and hardened surface techniques with the Mudbox sculpting toolset. Finally, you'll work through a texture painting workflow on a UV-tiled mesh.

I used Mudbox 2011 with the Subscription Advantage Pack, but everything covered here is applicable to the standard Mudbox 2011 release (and forward). If you're new to the software, a full-featured 30-day trial is available for download at **autodesk.com/mudbox**. The project files include a base mesh, NewBase.obj, to help you get started. If you have any questions about this tutorial, feel free to contact me at **craig.barr@autodesk.com**.

How to use this tutorial
First, visit 3dworldmag.com/141, where you'll find details of the screen-capture videos that accompany this tutorial. The videos are also available at youtube.com/3dworld. Use the video player's controls to skip to a timecode listed in the text, read the overview, then play the footage.

Videos 1-8

Sculpting the base form
You'll begin this stage by sculpting simple rock and root structures across the base mesh, and end by defining a tree across the creature's back. The primary tools here are Wax and Foamy. These work in a cumulative manner, adding or removing material to build up primary shape and form.

Keep adjusting your brush's Size (press [B] and drag) and Strength (press [M] and drag) to vary the effect on the surface. Work in layers as you sculpt. Whether you're sculpting or painting, layers provide a means of storing history; the ability to blend with other layers; and a means of control by isolating features. Once you have your base rocks, boulders and roots in place, you'll use organic and hard-surface techniques to define the mesh surface.

▶ Video 1 00:01:44
Base blocks
Using the Foamy or Wax tools, start by working in the base boulder and rock shapes. Right now you're concerned only with building primary rock form and structure. Work quickly to rough in shapes of varying size and depth, leaving gaps and spaces between the boulders. You'll work on filling these gaps with root and vine detail later. »

Video 1 00:01:44
Begin by sculpting rough boulder shapes on the left leg; you'll refine these forms later on

WATCH THE VIDEO
Follow the entire workflow for creating a tree troll in Mudbox
3dworldmag .com/141

Over
3 hours
of video
workflow

Craig Barr's tree troll
takes advantage of
Mudbox's custom sculpt
tools and accessible UV
painting workflow

» ## ▶ Video 3 00:05
Rock definition

Now let's focus on providing some definition to your boulders and rocks. Using the Scrape, Flatten and Pinch tools, work the surface with sharp chips and hammer marks. The Scrape tool works by minimising or removing protruding features, and is a quick and effective method for producing a chiselled look. Pay special attention to working the edges with these tools to produce a hardened, weathered effect.

▶ Video 4 00:05
Add a custom tool

Mudbox enables you to quickly store a customised tool. This is an effective way to store favourite tool settings to access from the tray when needed. With the Scrape tool selected, click Add Tool from the Sculpt Tray pop-up menu. Name the tool **Random Scrapes**. Enable Use Stamp Image and select bw_square.tif from the Stamp tray, then enable Randomize. Under Advanced, adjust Min Size to 100 and Min Strength to 60. Set Stamp Spacing to 35 and adjust as necessary.

❚❚ Video 4 03:26
Using Falloff

Falloff controls the profile shape of a Sculpt or Paint tool. Soft, feathered strokes or sharpened results are achieved by using the presets in the Falloff tray or through manual adjustment. You can edit the Falloff shape for any tool and then save your custom settings to the tray.

❚❚ Video 4 09:22
Sculpting with vector displacement

Vector displacement mapping in Mudbox provides an effective means of storing an accurate representation of geometric features in an image
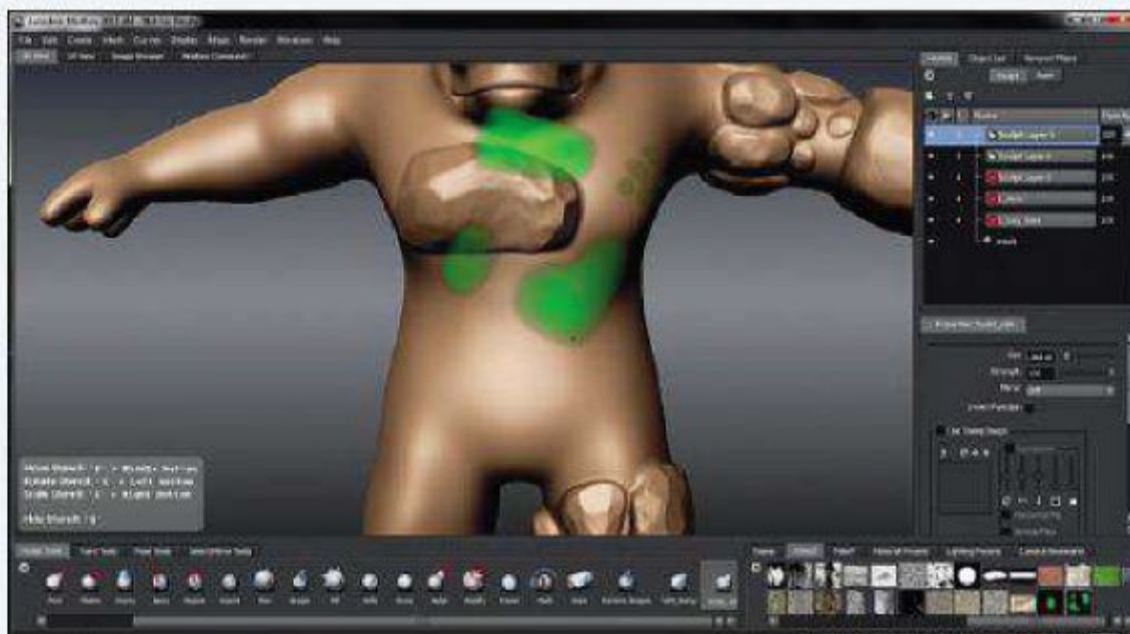
format. There are three primary benefits to using vector displacement in your sculpting workflow: first, storing complex features in the form of a stencil; second, storing smaller features to quickly repeat across a surface as a stamp; and finally, using a vector displacement stamp as a custom nib to alter the effect of a Sculpt tool.

I've provided a simple vector displacement stencil sheet (Rocks_vdm.tif) to help speed up the boulder and rock shaping process: it's in the project files' VDMs folder. Using the Sculpt tool with Strength set to 100, rub the detail onto the surface. Hold [S] and use the left, middle and right mouse buttons to move, rotate and scale the stencil and fill up the surface. Leave the right lower leg, left forearm and back areas empty for now.

▶ Video 5 00:27
Sculpting the root structure

Working with the idea of a tree woven throughout the character, let's make one of the legs a stumpy root structure that flows up, under and around the boulders that comprise the body. Move to the lower right leg and, with the Wax tool, sculpt overlapping roots. Start from the knee and sculpt roots that flow and twist down and around the leg. Now, in the Viewport Filters tab, enable Ambient Occlusion (renamed to Cavity Ambient Occlusion in the Subscription Advantage Pack) to help view your sculpting definition.

▶ Video 6 05:05
Making a custom vine tool

Select the Sculpt tool, then choose Add Tool. Name the new tool **Vine_vdm**. From the Stamp Tray pull-out menu, select Add Stamp and import the Vine_vdm.tif stamp from the project files. Next, set Strength to 100 and use the default Stamp Spacing. Via the Falloff tray, select the square preset, which represents an absence of falloff. Use this tool to produce tight, tube-like roots and vines across and in-between rocks.

▶ Video 7 00:05
Sculpting the tree

Using the same techniques that you employed earlier for the lower right leg, build up twisting roots that define the tree shape and carry across the tree troll's back. As you sculpt with the Wax tool, extend the roots up to the shoulders and down the lower back. Use Scrape, Flatten and Pinch to sharpen the top of the stump.

▶ Video 8 03:26
Distort the tree shape

The Grab tool selects and moves vertices in the direction you drag. Adjusting Falloff varies the effect. For this step, you need to use Grab to distort the shape of the tree. In the video, I show you a tip for using the Grab tool to distort geometry with a force-field-like effect.

▲ Video 9 04:21
Keep looking at the head from different angles as you work on it, so you can assess how strong the overall silhouette is. Make adjustments to the jawline and cheeks to establish a distinctive shape

▲ Video 10 00:05
Bring roots over from the back and work them into cavities in the troll's facial features

Videos 9-12

Head shape and form

The intention for the primary form of the head is to produce something that's skull-shaped, comprised of only a few boulders and with a weathered and chipped appearance. You should purposely sculpt the secondary forms on this character to avoid a symmetrical look; but for the head's primary shape, it's a good idea to sculpt with Mirroring enabled. Use the inverse of the Wax tool (hold down [Ctrl]) to remove material along the nose, temples and under the cheek bones. Tumbling and altering your angle of view is a good way to check forms as you sculpt.

▶ Video 9 04:21
Sculpting facial features
By inversing the Wax tool and using a broad falloff, you can quickly carve some crude nostril slits. Break up the symmetry by distorting the left eye, cheek bone and jaw line with the Grab tool. Alter your viewing angle to adjust the silhouette of the face.

▶ Video 10 00:05
Hand-like roots
I thought an interesting approach to this character would be to have the roots pulling and distorting the face in an almost hand-like form. Extend the tree roots up the back of the head and into and around the left eye. Use the Wax and custom Vine_vdm tools

to define the roots, knuckles and tendons. It's a good idea to build up some of the rock into the vines along the cheek area.

▶ Video 11 01:19
Define the head
Sculpt rock forms into the side of the head and work with the Scrape techniques you used previously. The custom Random_Scrapes tool is a quick way to break up the surface with light chips and dents.

▶ Video 12 03:54
Troll teeth
Sculpt the teeth using the Wax or Bulge tools, working from above and below to help pull the geometry outwards.

Videos 13-15

Sculpting the left forearm

I sculpted this creature asymmetrically to break up the balance between primary body shapes and forms. The right arm is mainly comprised of rocks and boulders that form into a hand. The left forearm, however, consists of a single large boulder, with twisting, flowing roots holding the arm together and combining to form a crude, claw-like hand. This produces a more dynamic form and structure, as well as reinforcing the idea of a tree growing through the character.

▶ Video 13 00:05
Fill the gaps
Take advantage of the rock stencil sheet, the custom tools you've created and the Sculpt tools to fill in the gaps between the rocks and boulders. Flowing roots, tight vines and smaller rocks are an excellent way to break up the surface of the character and keep him from resembling a simple pile of rocks.

⊪ Video 13 02:51
Modelling with Pose tools
The Pose Tools tray contains tools for deforming or manipulating your character into dynamic poses.

▲ Video 12 03:54
Even trolls have teeth! Make use of the Wax and Bulge tools to make them stick out

▲ Video 13 00:05
Shape vines to go between and over the body boulders to tightly integrate the varied surfaces

They're also effective modelling tools. Working on the left arm, select the Create Joint tool and place a joint just past the elbow at the base of the forearm. (Hover over the joint for tool tips.) With Pose selected, hold [Shift] and middle-click to proportionally scale up the forearm. Deselect and move outside the figure, then use the middle button to translate the forearm back towards the elbow.

⊪ Video 13 09:02
Sculpt the left-hand roots
Using similar techniques to the ones you employed for sculpting the tree roots, define a series of roots across the forearm boulder. Have them overlap and end at the claw-like tips. Be sure to use the bold Falloff preset to give some edge definition to the roots as you sculpt. Experiment with the Wax and Foamy tools to discover different ways of affecting the surface.

▶ Video 14 05:06
Root flow
To blend the root hand into the rest of the arm, continue to flow and weave roots and vines between the rocks along the upper arm. Use the custom Vine_vdm tool to fill tight spaces and overlap larger roots. Get creative with where and how the roots »

▲ Video 14 05:06
Unite the left forearm with the rest of the body by flowing vines along the length of the arm

end. Creating little pits and holes in the rock is a nice way to tie in flowing roots and vines.

▶ Video 15 02:37
Vector displacement stamp: spikes
Create a new Sculpt Layer. Via the Stamp tray's pop-up menu, select Add Stamp and import VDM_Stump. Select the Imprint tool and then the VDM_Stump stamp. Dragging over the mesh positions and scaling the stamp (the Subscription Advantage Pack enables you to pull from the centre of the image), place spikes of various scale across the top of the head to break up the overall silhouette of the character. The custom Vine_vdm tool is a quick way to tie the stump spikes into the roots.

Videos 16-19

Texture painting with UV tiles
The base mesh has UVs laid out across six tiles outside the default 0 to 1 range. This enables you to take advantage of greater texture resolution in specific areas. Instead of working with one very large resolution map, you'll work with six textures at 2K resolution. By default, Mudbox will optimise the display of UV tiles, while minimising the effect on GPU performance by displaying one UV tile at a time. Use the up and down arrows to hide or show specific UV tiles. Pressing [Ctrl]+[Up arrow] enables you to work with all UV tiles displayed simultaneously.

▶ Video 17 00:05
Hand-painted bump
In Paint Layers, create a 2K bump layer and name it **Cracks**. Use the Paint tool with a solid black colour, and a sharp Falloff for a tighter brush. Hand-paint cracks along the face, chest and arms. Keep adjusting your brush's Strength, Size and Falloff to vary the effect.

▶ Video 17 02:33
Stencil bump rock detail
There are many texture resources available on the web. The stencils I use here can be found in the Stencils tray or at the Mudbox Community, which you can access via the Mudbox Community tab in the viewport or at **area.autodesk.com/mudcom**. Use crack, grime and rock textures with the Paint Brush tool to fill the surface with detail. A concrete or pore stencil is a good way to add some grit to the rocks.

▶ Video 17 06:48
Duplicate and reuse layers
Bump mapping doesn't actually distort the surface, so you can't take advantage of ambient occlusion to view its forms more clearly. A simple trick is to right-click the bump layer and choose Duplicate Selected, then drag it up into the Diffuse Channel. (If the Diffuse Channel isn't visible, create a new layer and set Channel to Diffuse in the dialog.) Taking the layer Opacity above 100 will produce darker results.

▶ Video 18 01:14
Ambient occlusion as a visual guide
A good way to visualise your sculpted shapes and forms while you paint is to use Ambient Occlusion in a paint layer. Select Maps > Extract Texture Maps > New Operation and select Ambient Occlusion Map in the dialog. Add your mesh into Target Models. Change Quality to Fastest and leave Image Size at 1K. Next, enter a filename to output to and click Extract. (The video shows the slightly different Subscription Advantage Pack workflow.) By default, Mudbox will add the Ambient Occlusion map as a paint layer. Lastly, change the blend mode to Multiply.

▶ Video 18 04:04
Painting in UV space
Mudbox enables you to paint on geometry flattened in UV space. To do this, hover over the mesh and press [Alt]+[T] to enable UV Space mode. Create a new paint layer and name it **Rock Base**. You can use UV Space to fill up your mesh quickly with a base texture. Use your Ambient Occlusion layer as a visual guide to paint specific rocks and to avoid the large root and tree structures.

▶ Video 18 04:35
Base diffuse map
Select the Projection tool, then choose the Image Browser tab at the top of the viewport. Browse to the tileable texture Rock_tile1.png in the project files. Click the Set Stencil button in the toolbar to place this image in the viewport as a stencil. Back in the 3D View in UV Space mode, scale and rotate the map over the model. Under the Properties tab for the stencil, open Advanced and select Use Tiles. Fill the mesh with base rock detail.

Video 17 00:05
Create a separate layer to apply subtle bump map effects, such as cracks appearing in the rock to suggest the age of this troll creature. Adjust Strength, Size and Falloff to keep the visual interest throughout

Video 18 01:14
The video shows the Ambient Occlusion options available in the Subscription Advantage Pack

Video 18 04:04

Work in UV Space for a speedy way to add a base texture across your creature. Enable ambient occlusion to help avoid non-rock areas such as the tree stump and right leg

Video 18 10:14

After adding the base rock texture, return to the 3D View and work over the texture to get rid of any seams

▮ Video 18 10:14
Alter the rocks

Press [Alt]+[T] to return to the 3D mesh. Turn off the Ambient Occlusion Layer display. Create a Diffuse layer and use different textures to alter rocks across the mesh. Use maps to fill any seams from the UV layout and paint in angled views to cover the edges.

▶ Video 19 06:36
Stamps: bump root detail

Create a new Bump Map layer; label it **Root Bumps**. In the Stencils tray, click Off to deactivate the stencil. Select the Paint Brush tool. Using stamps such as Rake, Fiber and Bristol enables you to paint along the shapes of the twisting roots. Play with brush strength and size and layer opacity to achieve different results.

Videos 20–21

Colour adjustment and specular

The Paint Tools tray provides a nice suite of colour adjustment tools. Use these as a means of defining

and highlighting areas of the body (like the chest and shoulders). You can quickly manipulate colour values on specific areas of the mesh to adjust the overall feel and look of the rock textures.

▶ Video 20 07:32
Colour adjustment tools

The final videos cover some techniques for adjusting the colour values on the creature. The Hue Brush enables you to replace the hue value without affecting the saturation or luminance of the texture. The Sponge Brush increases or decreases the saturation. The Contrast, Dodge and Burn brushes are excellent for lightening or darkening specific features on your textures.

▶ Video 21 00:05
Add some moss

I've provided two moss stencils in the project files. Both of these work well for adding some moss detail to the rocks and the roots. Use the Projection tool to stencil in moss along the bottom of the feet while

Video 19 06:36

Explore the Stamp Tray for options while you paint in details within the root-dominated areas

Video 20 07:32

With the textures added, create a unified feel by adjusting the hue and saturation in different areas

Video 21 07:17

For specular highlights, create a new layer and add detail on the raised parts of the troll's body

working on the legs. You could also place some moss along the bottoms of the arms, and on a rock or two across the chest.

▮ Video 21 07:17
Painting specularity

Create a new Specular paint layer and name it **Rock Edges**. Select the Dry Brush tool and use a pure white. Mudbox's Dry Brush tool enables you to apply paint detail only to the raised areas on the mesh. Inversing the Dry Brush by pressing [Ctrl] enables you to isolate paint to the lower areas only. Adjust the layer opacity to tone down the specular highlights. You can also duplicate this layer and blend it with the Diffuse channel to produce weathered edge effects. ■

All the assets you need
A base OBJ model, textures and stamps are on the disc

▶ Lightmaps created in Gimp can then be used for lighting and reflections in your own 3D scenes

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qa@3dworldmag.com

Gimp
"How can I create light maps in Gimp?"
Jen L, via email

Cirstyn Bech Yagher replies:

Light maps can be a little finicky to create: they're all about guides, shapes and layers. Having a basic, time-saving template will hopefully make up for this. Start by defining a grid for the walls. Select File > New Document. Set Width to 3600 and Height to 1800. With View > Show Rulers enabled, create horizontal guides at the following points: 450, 550, 900, 1250 and 1350. Then create vertical guides at 450, 1350, 1800, 2250 and 3150.

For the walls, you need to create a new layer via [Shift]+[Ctrl]+[N]. Using Rectangle Select in the Toolbox, create a rectangle along the 1350 and 2250 vertical and the 450 and 1350 horizontal guides. Fill it with white and select the rectangle with the Fuzzy Select tool.

Choose Filters > Distort > Curve Bend. Enable Automatic preview and click Mirror. This mirrors the top curve to the bottom. Using the Modify Curves grid to keep your curve centred, drag the middle point straight upwards to about halfway up the first square; aim for a soft slope within the 550 and 1350 horizontal guides. Click OK. Right-click the Floating Selection layer and select Anchor Layer.

Next, duplicate the layer via [Shift]+[Ctrl]+[D]. Select the curved rectangle and fill it with RGB 128. Shrink it by between 15 and 30 pixels via Select > Shrink. Once you've done this, press [Delete] and [Shift]+[Ctrl]+[A] to deselect.

You now have a basic edge for the walls, which you can manipulate and duplicate across the rest of the grid. Duplicate this and the curved box layers four times. Using the Move tool, fit the copied layers into the grid-guide outline, making sure that all the shapes are aligned. Next, name them according to their positions. (See the accompanying video for guidance.)

Now that you have the basic shapes in place, you can tweak lightness and sharpness. Let's try a version with one light source and soft edges: Select the walls either side of the middle block and fill them with RGB 164. Select the outermost walls and fill them with black. Set every edge layer to 50% Opacity and add Filters > Blur > Gaussian Blur with a value of 20.

To edit the floor and ceiling, set the foreground colour to RGB 147 via the Toolbox. Create a new layer under the shapes. Select the Blend tool, then set Shape to Bi-linear and Repeat to Triangular wave in Tool Options. Position your cursor where the 900 and 1800 points meet, then drag down to the 1350 horizontal guide before releasing.

You can save the file as a TIFF to use directly, or use a package such as HDRIshop to tweak exposures, then save it as an HDR file. The video shows the file in use in Vue to give you an idea of how it works in practice.

▼ Notice the size of the bones in relation to the mesh. Avoid having your bones too small or too large: it will result in a lot of envelope tweaking later

▶ Moving the endpoints of the envelopes back will help to regain a crease in the arm and produce a more natural bend

3ds Max
"How can I get a good crease on a limb joint?"
Steve Cramer, from the forums

Mike McCarthy replies:

When skinning a limb such as an arm or leg, you can frequently get a bendy or rubber effect. Unless you're creating a cartoon character, this look is usually undesirable. I find that setting up your bones at the proper size can help a great deal with initial skinning. Make sure that the bone's thickness occupies about 50 to 75% of the mesh's volume. Adjust the bone's width and height in the Modify panel: it's never a good idea to scale bones, because it may cause unexpected deformation.

Initial skinning is based on envelopes that are assigned to each bone selected in the Skin modifier. The envelopes are set up automatically, and it's this process that can cause issues. When you add a Skin modifier and pick your bones, Skin has done 80% of the task for you – but there's still more work ahead. I recommend adjusting your envelopes to the best of your ability, then moving on to exclude vertices from bones and add vertex weighting where needed.

If you're getting rubber arms after applying the Skin modifier, this can quickly be fixed by adjusting the envelopes for the upper and lower arms. Editing the outer and inner radius for the envelopes can often give the result you're looking for, but many times, the automatically generated envelopes at a joint can be too long.

There are basically three parts to a skin envelope: the inner radius, the outer radius and the length. When first starting to skin characters, you might not adjust the length

too much, but it's just as important – or even more so – than the inner or outer radius. In this example, if you select the end point of each envelope at the joint and then move it back and away from the joint, the crease should start to come back, and the rubber hose look will diminish.

Next, you may want to adjust the outer radius of these two envelopes so that there's a decent amount of overlap, which is important for smooth skinning. This is a more natural look for an arm or a leg to bend. Once you have better deformation in the limb, you can move on to using vertex weights, joint deformers or SkinMorph to get even better detail.

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◼ Using a repeating gradient within your light map layout can help you to fake wall and room gradients in your 3D object

◼ Once you've got the grid guides and some basic shapes in place, you could then try elongating your boxes for a different look

Cirstyn Bech-Yagher is a longtime 3D freelancer and is currently working on a series of tutorials aimed at newcomers to 3D
northern-studios.com

The MoGraph Multi Shader that's loaded in the Luminance channel will provide the colours for the flashing control panel

By animating the seed value of the Random Effector, the colours will flash all over the board when rendered to the Picture Viewer

Cinema 4D

"How do I set up a sci-fi control panel with random flashing colours?"

Alan Donaldson, via email

Anders Kjellberg replies:

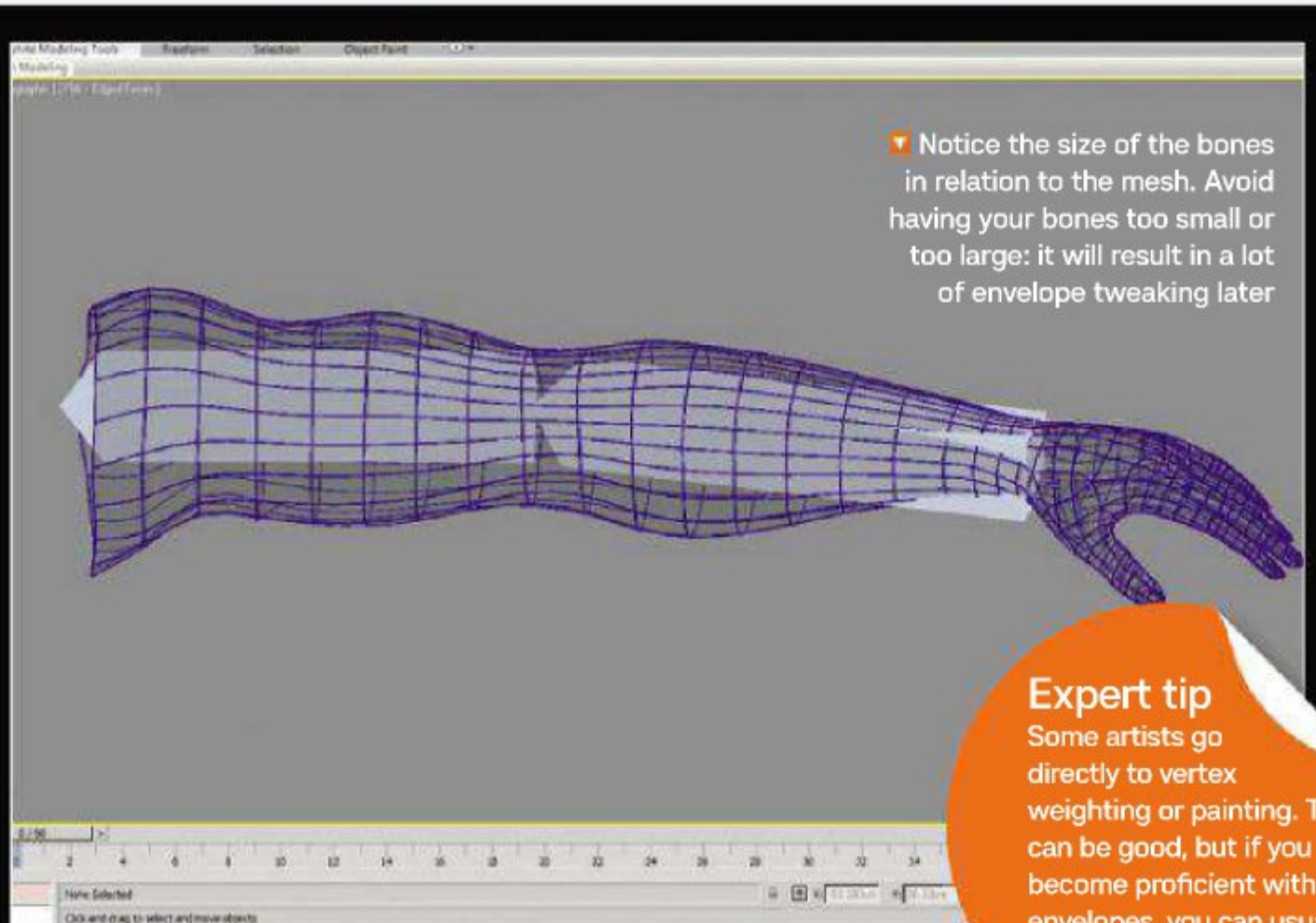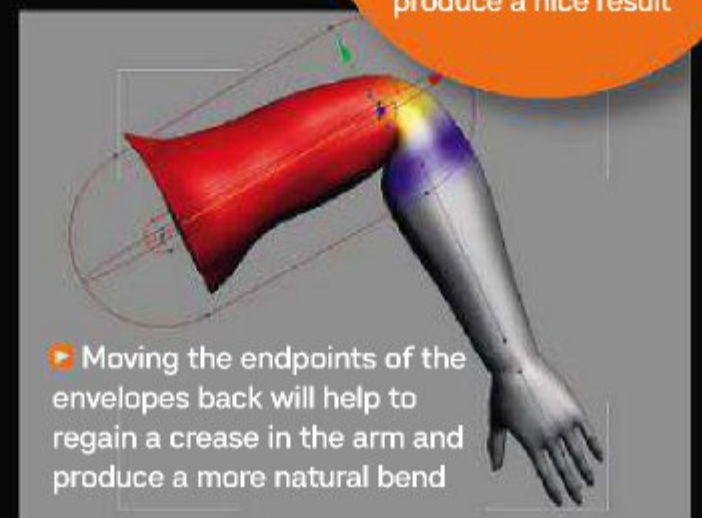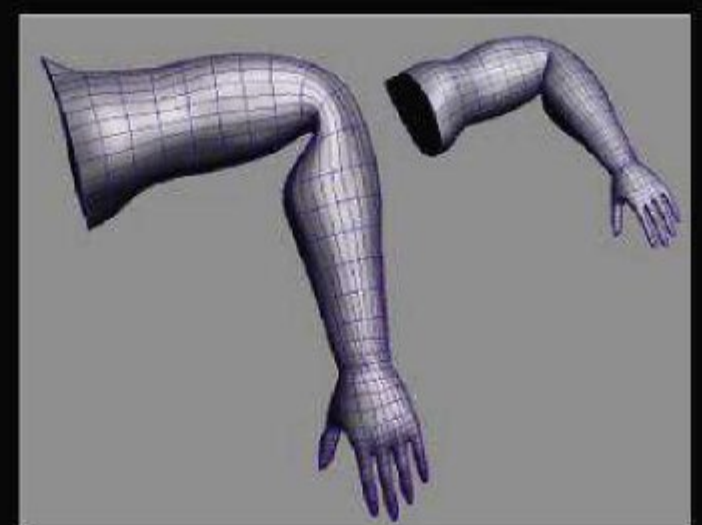You can never have too many sci-fi control panels with random flashing colours. The easiest way to create them is to use the MoGraph Multi Shader. Open Random_Colors_Start.c4d from this Q&A's project files. In the Attribute Manager, open Colors inside the Control Panel group: you'll find a Cloner Object cloning a simple polygon square to make up the lights panel. A viewport test render shows the cloned square as just plain white with black edges; you're going to modify the white material to visualise a flashing panel.

The first step in this process is to select the Random material in the Material Manager. In its Luminance channel, click the options arrow for Texture and select MoGraph > Multi Shader. Click the colour thumbnail to access the actual shader, and then click the options arrow for Shader 1 and select Color. Select the new thumbnail and give the shader a pure red colour. Now click the arrow next to Shader 2 and load a colour – this time, make it pure green. Click the Add button to add a new

shader slot, then give it another colour. Repeat the process a couple of times to add more colours. The control panel will flash all of the colours you create here.

Once you've added the colours you want, do another viewport test render to check your progress. Although the cloned square is no longer white, it's still only displaying one colour. To address this, you need to select the Cloner in Attributes, then choose MoGraph > Effector > Random Effector. In the Attribute Manager for the Random Effector, select the Parameter tab and untick Position. Expand Color and change Color Mode to On. A quick render shows that each cloned square now displays a random colour.

Now, in the Random Effector Attributes select the Effector tab. Make sure that the timeline is at frame 1 and [Ctrl]-click the black outlined dot in front of Seed. Scrub the timeline to frame 90, adjust the Seed value by five or so units and [Ctrl]-click to set a new keyframe. To see the effect of the random colours, you need to render the animation to the Picture Viewer.

Anders Kjellberg is a freelance 3D artist residing in Sweden. He produces work for print and broadcast media
dogday-design.se

Softimage

"How do I rig an accordion lamp?"

Paperfrog, from the forums

Ola Madsen replies:

An accordion lamp consists of a series of individual arms, which are mounted in pairs to create a framework of X shapes. Moving any of the arms will cause all the pivots to rotate and either expand or contract the framework. Open the scene Accordion_Lamp.scn from this Q&A's project files. It shows a set of connected arms, which are parented under null objects to represent their respective centre joints.

Select the Center1 null and press [Ctrl]+[K] to open its Local Transform PPG. Right-click the animation icon (the green divot) for the Position X and choose Set Expression. The arms are distributed linearly between the base (the part attached to the wall mount) and the lamp. Since there are four pairs of arms, the first joint should be located at 1/8 of the distance to the End null. In the Editing Pane of the Expression Editor, enter
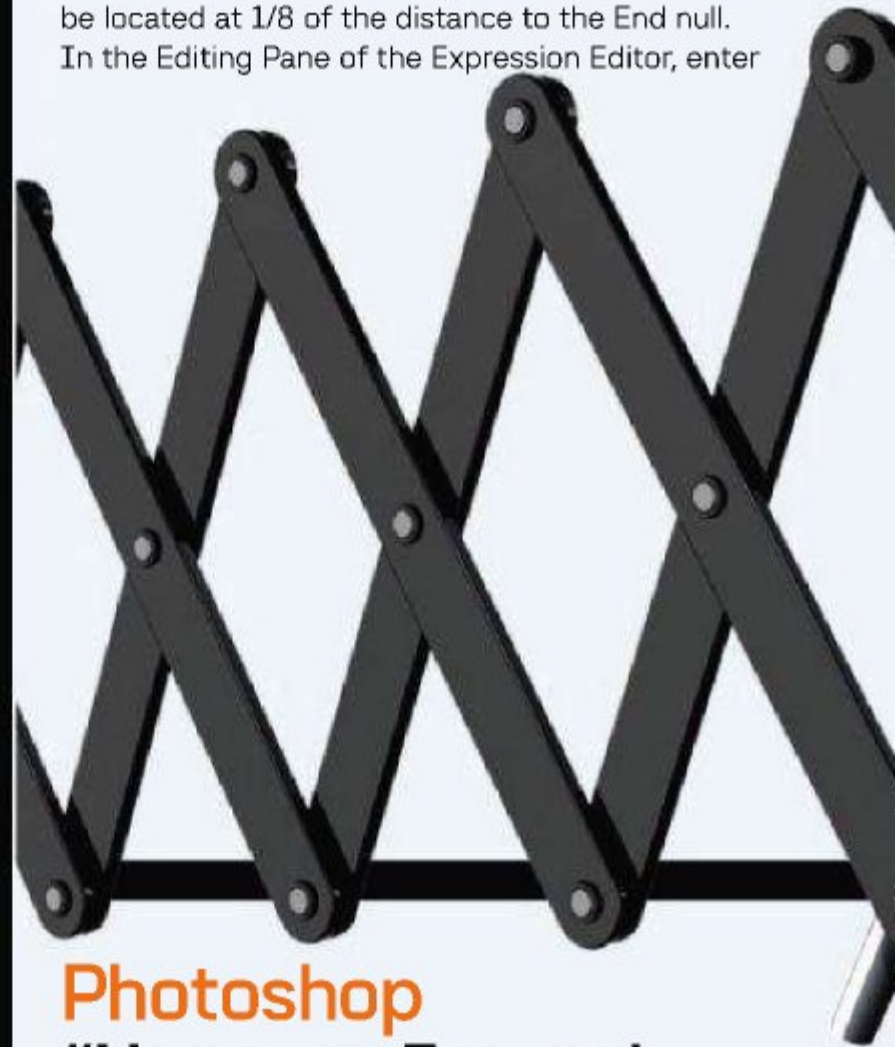
Photoshop

"How can I match extra texture layers to a camera angle?"

Luke Rana, via email

Richard Tilbury replies:

Adding different decals, extending part of a scene or modifying a texture in a render doesn't have to mean altering the UVs, templates or geometry. Rendering can be a lengthy process, so doing this in post-production can be a great time-saver. The Vanishing Point filter is perfect for this kind of task.

Richard Tilbury works part-time at 3D Total as its resident artist, alongside working freelance as a concept artist and illustrator
richardtilburyart.com

1/8*End.kine.local.posx and click Apply. Open the Local Transform PPG for the Center2, right-click the Position X animation icon and set the expression 3/8*End.kine.local.posx. Now repeat this for Center3 (5/8*End.kine.local.posx) and Center4 (7/8*End.kine.local.posx).

To determine the Y position of the top joint of each arm as it rotates, you need another null object – but even more, you need the Pythagorean theorem. This states that if you know the length of two sides of a right-angled triangle, you can calculate the length of the

■ Looking at the accordion lamp, you'll see that it's in fact made from multiple triangles. The Pythagorean theorem will come in handy for this project

third side ($a^2 + b^2 = c^2$). The length of side a is the distance between the wall mount and the Center1 null. The length of side b is the distance between the centre joint and the top joint of the arm; 3.5 units, in this case. Select the Top_Joint1 null and open its Local Transform PPG. Right-click the Position Y animation icon and choose Set Expression. Enter sqrt(pow(3.5, 2) – pow(Center1.kine.global.posx, 2)) and click Apply.

For Top_Joint2, you must calculate not only the Y position but also the X position, which will change as the framework expands or contracts. The joint will always be located at the middle of the Center1 and Center2 nulls, which you can calculate by adding their X positions and dividing the total by two. Open Top_Joint2's Transform PPG and set an expression for Position X: enter (Center1.kine.local.posx + Center2.

kine.local.posx) / 2 and click Apply. When you've done that, close the Expression Editor and set an expression for Position Y. The length of side b is still 3.5 in this triangle, but side a equals half the distance between Center1 and Center2. Enter sqrt(pow(3.5, 2) – pow((ctr_dist(Center1.kine. global.pos, Center2.kine.global.pos) / 2), 2)) and click Apply.

Select Arm01. From the Main Command Panel's Constrain menu, choose Direction and pick the Top_Joint1 null. Select Arm02 and apply another Direction constraint, but pick Top_Joint2 this time.

Now follow the same procedure of setting expressions and constraints for Top_Joint3 and 4 and their respective arms, adjusting the centre null names in the expressions to match. The accompanying video shows further adjustments to the arms to tidy up the animation.

Ola Madsen is a Softimage Certified Instructor and a long-time Softimage user. He works as a 3D artist at Digital Context in Sweden
caffeineabuse.blogspot.com

Expert tip
Once you have the rotation for one arm, just add an equal expression to other arms' Z rotation: Arm01.kine. local.rotz for odd, –Arm01. kine.local.rotz for even

■ The distinctive design of the accordion lamp may look simple to rig, but don't be fooled. As the lamp expands or contracts, the joints at each end of the arms move in a circular motion, rendering the standard constrains useless

01 Selecting the filter
To try Vanishing Point, open Range01.jpg in this Q&A's project files. Imagine you've been asked to place some numbers along the floor corresponding to the tee-off platforms. Create a new layer, select the Background layer and then choose Filter > Vanishing Point. Using the Create Plane Tool (which is selected by default), click four points to block out a shape that corresponds to the floor perspective. Click OK.

02 Adding the image
Open Numbers02.jpg and choose Select > All. Copy the contents. In the driving range photo, select the new layer and then open the Vanishing Point filter again. It's retained the grid you set up earlier. Paste the numbers image into the scene and move it onto the grid: it should automatically adopt the perspective based on the grid shape. Select the Transform Tool [T] and then scale accordingly. Change the blending mode and Opacity value to suit.

03 Duplicating an element
If you want to duplicate an existing part of your 3D scene, select the Marquee Tool [M], highlight the relevant area and [Alt]-drag it to a new location. Open Alley03.jpg from the project files and create a Vanishing Point grid between the doors in the right foreground wall. Paste in the Graffiti04.psd example and, using the Transform Tool, [Alt]-drag numerous copies along the wall.

Maya
"How do I loop an nCloth simulation?"
TJ Price, via email

Gary Noden replies:

Creating great flags in Maya need not be difficult, especially when using nCloth, but can you get it to loop? Dynamically speaking, no, but in practice there's something you can do to overcome this.

Open START.ma from this Q&A's project files. It's a flag, set up to flap when you press Play. You don't want the animation to start as a static flag, so the first thing to do is find a frame in the flag's animation where it looks pretty; say frame 150. Via the nDynamics menu set, select nSolver > Initial State > Set from Current, then return to frame 1.

Next, cache a dynamic simulation for the cloth. Add 100 extra frames: you'll need these to aid the looping process. Select the nCloth flag and choose nCache > Create New Cache > options box. In the Options dialog, note the cache name and folder path. Click Create. When the simulation's finished caching, you can scrub through your animation.

Open Window > Animation Editors > Trax Editor. With your flag selected, click Create > Create Animation Clip. No clip will be created, but the flag will now appear in your Trax Editor. With your mesh still selected, select nCache > Attach Existing Cache File in the main menu; locate and select the cache you noted earlier. You should see the Trax Editor update to show two caches.

In the Trax Editor, slide the bottom cache to the right until the beginning is at frame 200. Slide the top to the left by 100 frames. This makes the first frame of the top cache and frame 200 of the bottom cache the same frame. In your attribute editor is a new tab, cacheBlend1. Here, you can see the two sliders for the caches. Move to frame 100 on your timeline and keyframe a value of 1 on
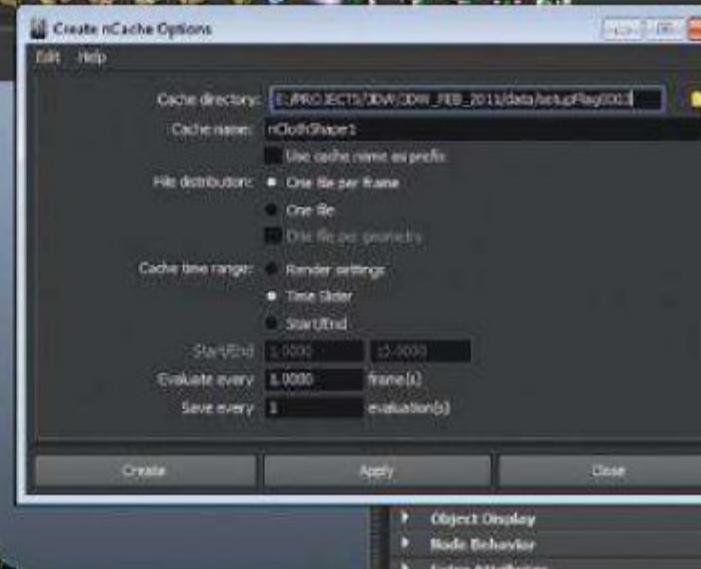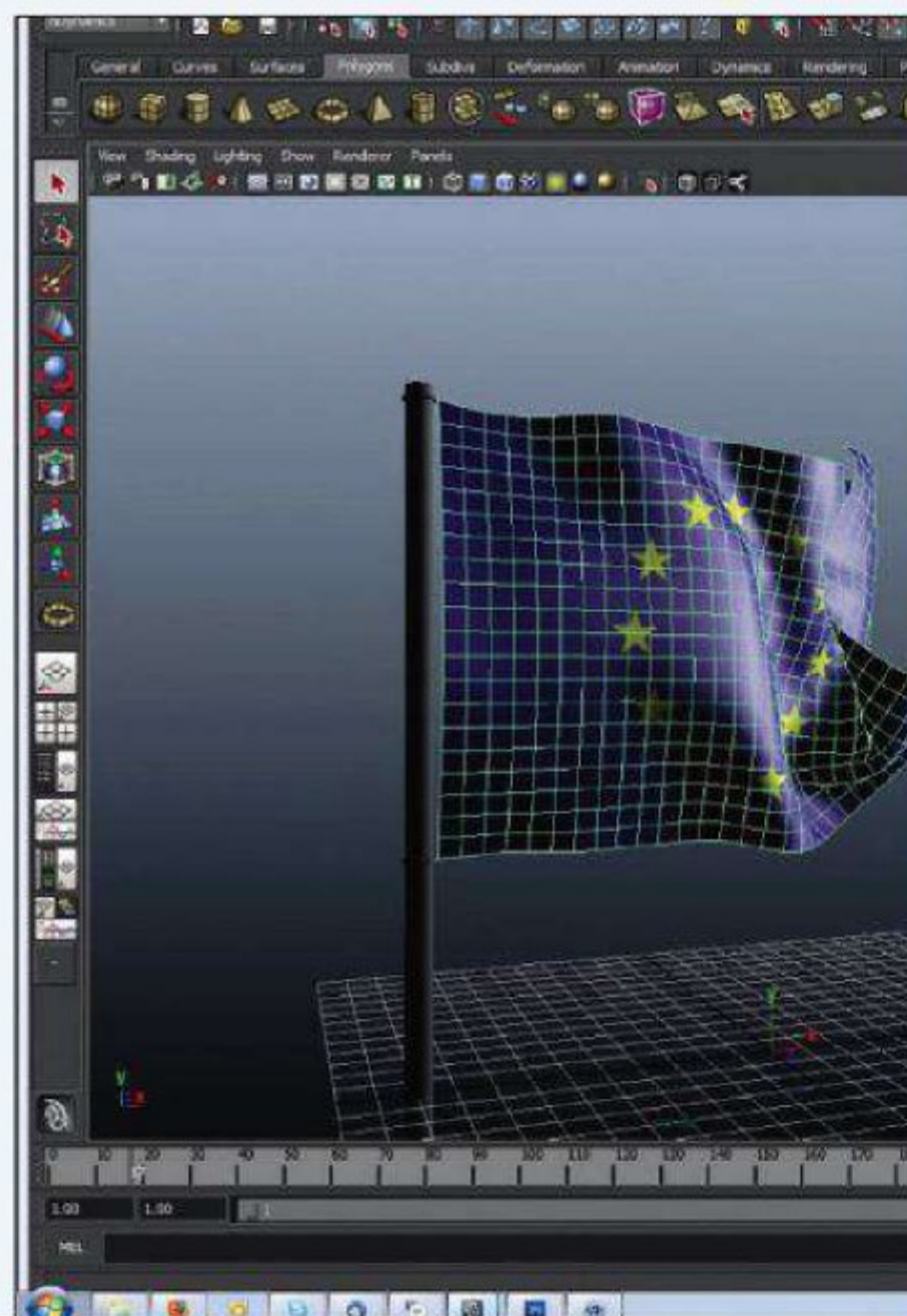
the top slider and 0 on the bottom slider. Advance to frame 199 and set a keyframe with the top slider at 0 and the bottom slider at 1. This blends from one cache to the other over four seconds. Change your timeline end point to 200 and play the sequence. Your dynamics loop over 200 frames.

Gary Noden is a freelance Maya generalist, VFX compositor and tutor with 18 years' experience, working in the Manchester area
garynoden.co.uk

Expert tip
Remember, this tip isn't just for flags: it could be used to loop other dynamic caches, and the same principles apply to geometry caches too

---

Unity
"Why do I get black detail meshes after baking terrains?"
Jake Green, via email

Adam Watkins replies:

Unity 3 has some powerful baking capabilities. Although lighting could be baked for terrains in previous versions, the ability to bake geometry in other lighting situations means much more baking is now possible. Strange results, such as black baked detail meshes, can be avoided and worked around with a bit of knowledge about the process.

Adam Watkins is a professor at the University of the Incarnate Word in San Antonio, Texas. He's currently on a research sabbatical
watkins3d.com
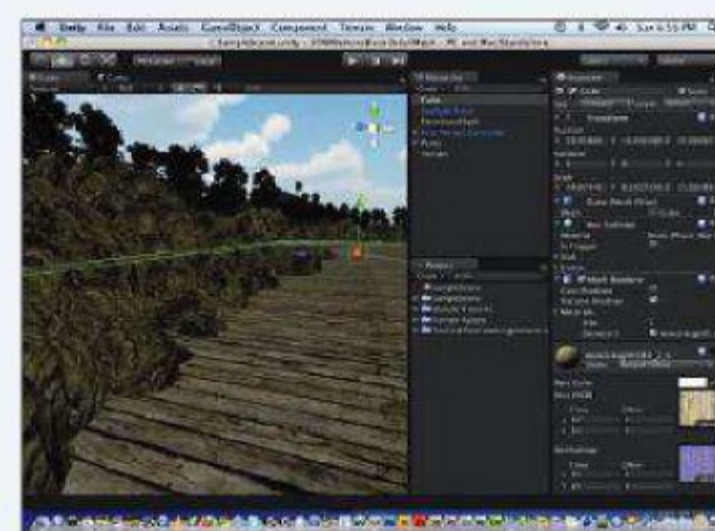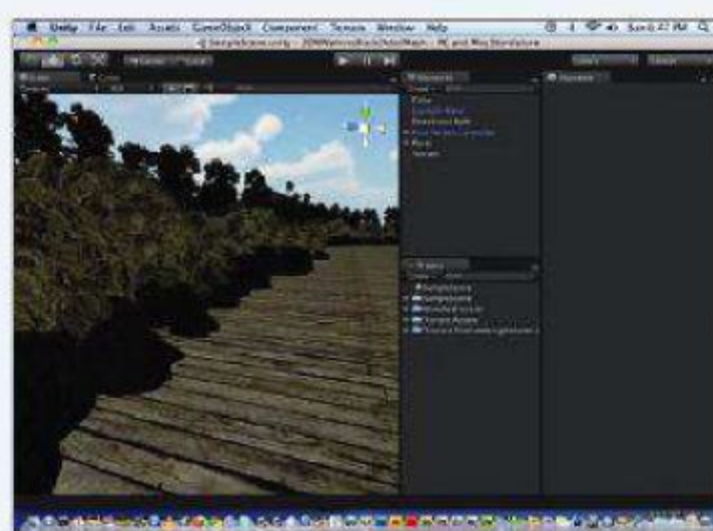
01 Finding the cause
The problem emerges when detail meshes are painted on a terrain. When terrain is butting up against geometry, these detail meshes render black when baked. Often, the terrain is beneath other geometry, which causes the terrain that the detail mesh is sitting upon to be rendered black. In baking, detail meshes inherit the shadow map of the terrain beneath them – so even if the detail mesh is above the non-terrain geometry, it will show up with the black of the terrain beneath it.

02 Turning off shadows
There are a few possible solutions. One is to turn off the Static option for the terrain, but that defeats the purpose of baking. A second solution, which often works with floors, is to make the floor object (the one covering the terrain) not cast shadows. The terrain beneath it will still be receiving full sunlight, so the detail mesh above it remains at appropriate lighting. Select the object covering the terrain. In the Inspector's Mesh Renderer panel, turn off Cast Shadows.

■ Creating a cache for your dynamic object is easy, and provides you with something that can help to simulate a seamless flowing animation

■ The Trax Editor is a great way to interactively adjust the positions of your particle caches, as well as enabling you to blend between them
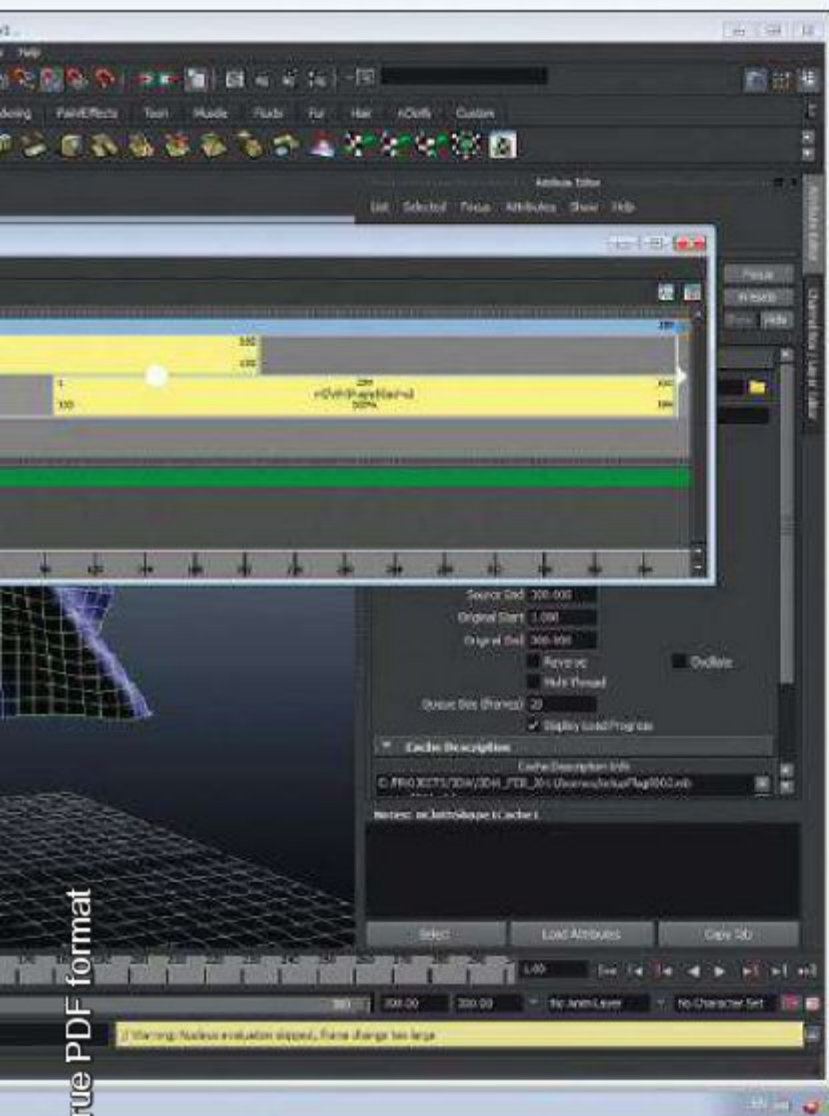
03 Raising the terrain
A third solution temporarily cheats the baking system by bringing the terrain above the floor. This needs fine-tuning: if the gap is too wide or high, the terrain will cast undesired shadows. The key is effective use of the 'Set terrain height' brushes in the Inspector's Terrain panel to bring it just above the height of the polygons blocking the light. Use a small brush and hold [Shift] to sample the terrain height just above the floor plane, then raise the terrain to about the centre of the rocks.

■ Here's a scene rendered with no depth of field – it's added later in post. This gives more flexibility and makes rendering faster

modo
"How can I set up an animated depth pass with visual DoF feedback?"
S Borell, via email

■ Here, you can see that all that's required are three nodes, which are easy and fast to set up. Not having to figure out your focal plane will save a lot of time in post

Fredrik Stenson replies:
Creating a depth pass so you can add depth of field in post-production gives you more flexibility, as well as shorter render times. The problem, though, is that you can't see the effect until you set it up in post, which makes it less interactive. On the other hand, setting up true depth of field in your 3D application gives you long rendering times and no flexibility should the client want a different effect. But with the help of modo's fast preview and some node rigging in modo 501, you can have both.

To export a depth pass from modo, you need to add a Render Output to the Shader Tree and set its Effect to Depth. In the item's Properties, you have a Maximum Depth channel, where you can control the range of the greyscale gradient you're going to output. The depth range is the key to setting up your depth of field in post-production.

If you're doing a still-frame render, you're good to go: you just need to make sure your Maximum Depth value is high enough. But if you're doing an animation, you may need to have the range changing over time.

There are a few ways of doing this. You could just key the Maximum Depth channel, or you could add a locator null to the item you want in focus, then do some rigging to have modo measure the distance from the camera to the locator. I don't like any of these methods, because they're not particularly interactive or quick to set up. And, perhaps most importantly, they'll create a lot of work to set up the focus in post-production, because you have no idea what value you need to use to get your object in focus.

When setting up your depth pass, there's one crucial thing to remember: the object that you want to have in focus should have a known greyscale value in your depth pass. This way, you can easily set up the focus plane in post, simply by typing that known value.

To set this up, I use the camera's Focus Distance channel, multiplying it by two before feeding the result into Depth Output's Maximum Depth channel. Now I know that the object my camera is focusing on will have a pixel brightness value of 0.5 in my depth pass, when using floating-point images in post (or a value of 128 when using 8-bit). If I don't double the camera's focus distance, the object that my camera is focusing on will be black.

With this technique, you get depth information both in front of and behind the object in focus. By using the camera's focus distance, you can see the depth-of-field effect in the preview, then turn off depth of field before the final render. ■

Fredrik Stenson is the lead technical artist at Forslund & Co. He's currently working on 3D effects and shading
stenson.tv

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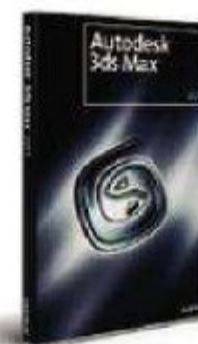
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3D WORLD *Reviews*

PRICE

V-Ray 2.0 for 3ds Max
• £840 / $1,350 / €970
Upgrade from V-Ray
1.5 (for licences bought
after 1 August 2010)
• £125 / $190 / €150
Upgrade from V-Ray
1.5 (for licences bought
before 1 August 2010)
• £339 / $545 / €400

PLATFORM

Windows

MAIN FEATURES

• Add flakes using
  VRayCarPaintMtl
• Stereoscopic rigs
• Control object
  interaction with
  VRayDistanceTex
  and dispersion
• Separate passes for
  individual lights
• Bloom and glare lens
  effects
• Realistic camera
  distortions

DEVELOPER

Chaos Group

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Gustavo Capote
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studio manager
for Neoscape's
UK studio, with
over 10 years' experience of
3D visualisation. He has won
countless awards, and his
work has featured in Ballistic's
Exposé and Elementals books
neoscape.com

◀ The new options in V-Ray 2.0 help you
create better and faster renders
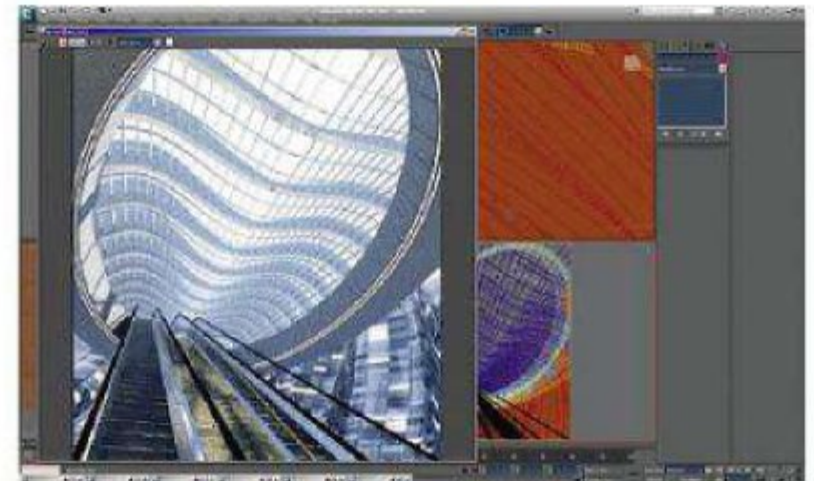
◀ Support for GPU-based renders means
much faster results, as long as your card
has sufficient memory for the scene

V-Ray 2.0

It comes complete with V-Ray RT and a host of new features, says **Gus Capote**, but will version 2.0 win over 3ds Max users?

The long wait for V-Ray 2.0 is over. We have to admit that our expectations of what new features this version would include and how strong the build was going to be were quite high, but Chaos Group has astounded us once again. The V-Ray 2.0 build is very strong, and we haven't found any major glitches – always a big concern when you're in the middle of a project and are tempted to upgrade your software.

Some of the new features are focused on making your life easier during production tasks, which we've found extremely useful. First up is the V-Ray bucket pass. Using distributed rendering is a day-to-day activity, and when a node stops working or causes problems with the render, it's sometimes a real challenge to find the computer causing the issues. With the DRBucket pass, you now know which computer has rendered a particular bucket and can quickly fix the problem.

The V-Ray frame buffer has undergone modifications to make it more user-friendly and interactive. The new render history enables you to save images and compare them in the frame buffer; and if you're working on stereoscopic images, you can activate or deactivate this view.

Then there's exposure control. If you like to use 3ds Max's cameras or do a quick test from a viewport, now you can control the same settings with a V-Ray camera – even the white balance. This is very useful, especially if you're using the RT version and need to modify a specific material or light, and want a closer look at the objects without the hassle of creating additional cameras specially for the task.

NEW MATERIALS

On the material side, the new VRayDistanceTex material and the Dispersion property have already become essential to our workflow. VRayDistanceTex gives you the option of controlling interaction between objects. You can use it for many different purposes: some as simple as adding a few contact shadows, and others more complicated, such as excluding objects from VRayFur or displacement, or even making variations on size, height and density based on the distance between objects.

Dispersion adds realism and interest to your glass materials, and can also be used in conjunction with caustics. But if you just want simple glass, the only thing you need to do is deactivate it on the material.

You'll also find VRayCarPaintMtl, which gives your car renders a great look, adding flakes and real colour variation to the material. It's straightforward to use, too. VRayMultiSubTex enables you to have different maps assigned to different objects' ID within one material. This means you can control the material properties of a group of objects at once, where you just need to change the diffuse material. It saves a fair amount of time when you want
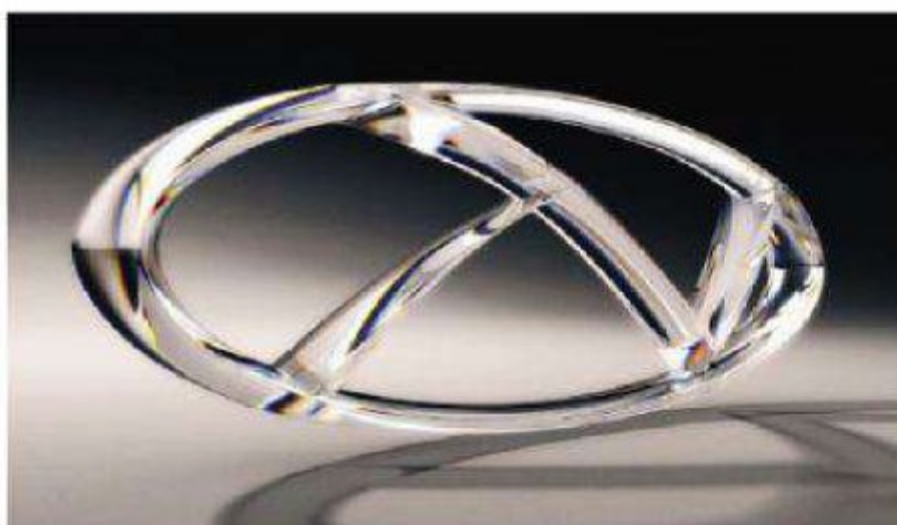
V-Ray 2.0 includes new materials for creating superior surfaces and textures

Compared to a basic glass material render (far left), the Dispersion property (near left) adds interest and realism

to add variations for big groups of objects, for example.

This upgrade also brings enhancements to the V-Ray lights, starting with the option to control light direction and dispersion. With this, a light plane can easily become a spotlight. For people who use the light lister, you now have a specific V-Ray one

more control over the effects in post-production. Finally in terms of effects, V-RayLensAnalysis helps you to reproduce real camera distortions.

There are typically two areas where the process for producing stereoscopic images is slow and time-consuming: the set-up and, in cases where you're using render

a graphics card other than an Nvidia you can still use RT GPU on your computer. However at this point, VRayCarPaintMtl and VRayBlendMtl aren't supported on the GPU version.

V-Ray 2.0 is a must-have update. The list of new features and improvements is impressive and, most importantly, it's fully working and stable, so you don't have to worry about major bugs if you update during production time. ●

"Our expectations of what new features V-Ray 2.0 would include were quite high, but Chaos Group has astounded us"

without any scripts or plug-ins. A major improvement for us is the light selection pass, which gives you the ability to save separate passes for specific lights in your scene. You can select single lights or groups, and also control the multiplier on the pass without affecting the intensity on the beauty pass.

ENVIRONMENT EFFECTS
In the previous version of V-Ray, you could use VRayEnvironmentFog with just one gizmo. Now you can use more than one, and blend them to generate different effects. There are also two lens effects in 2.0: bloom and glare. They work nicely and add great touches to your image. You can control the size, shape and camera parameters separately, and both effects can be rendered in the image or as render elements. The only restriction is that you need to use the V-Ray frame buffer in order to have the element pass: we miss the option of having just the effect on a black background, which gave us

solutions such as the Irradiance map, the calculation time. This is where the V-Ray stereoscopic rigs come in handy, giving you the chance to do the calculations just once and making the camera set-up easier. The rigs are a work in progress, in our view, but you can expect a revision soon.

CPU AND GPU OPTIONS
Real-time is the future of rendering, and having the option of working with either your CPU or your GPU is a great advantage. The GPU render was two or three times faster than the CPU render on the scenes we tried, but you need a powerful graphics card to manage big scenes – memory is still a major issue on the GPU. If you're planning to get a new computer or upgrade your equipment, set aside a substantial part of your budget for the graphics card: using the GPU render is a great way to work on your scenes.

One of the big advantages of the V-Ray GPU render is that it's not limited to CUDA acceleration, which means that if you have

The new lens effects work well, but you must implement them via the frame buffer

3D VERDICT

PROS
- V-Ray proxies render faster
- Glass dispersion adds realism
- V-Ray GPU is fully integrated
- Improved frame buffer
- Stereoscopic options

CONS
- GPU needs lots of graphics card memory on big scenes
- Lens effects don't render as single elements

A strong build bursting with features, this V-Ray update doesn't disappoint

Software
Cinema 4D
plug-in

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Non-commercial license
• £332 / $515 / €399
Upgrade from Effex 1.0
• £290 / $451 / €349

PLATFORM

Windows / Mac

MAIN FEATURES

• Fluid dynamic
  system capable of
  reproducing dust,
  smoke, fire, explosions
  and inviscid liquids
• Rewritten fluid
  core with hybrid
  particle-grid engine
• New oxygen
  combustion mode
• Recreates high- and
  low-viscosity materials
• Mixed viscosity
  and mixed density
  simulations
• Fast, multithreaded
  meshing solution
• Foam and spray
  generation
• SimpleParticles, TP
  and Xpresso support
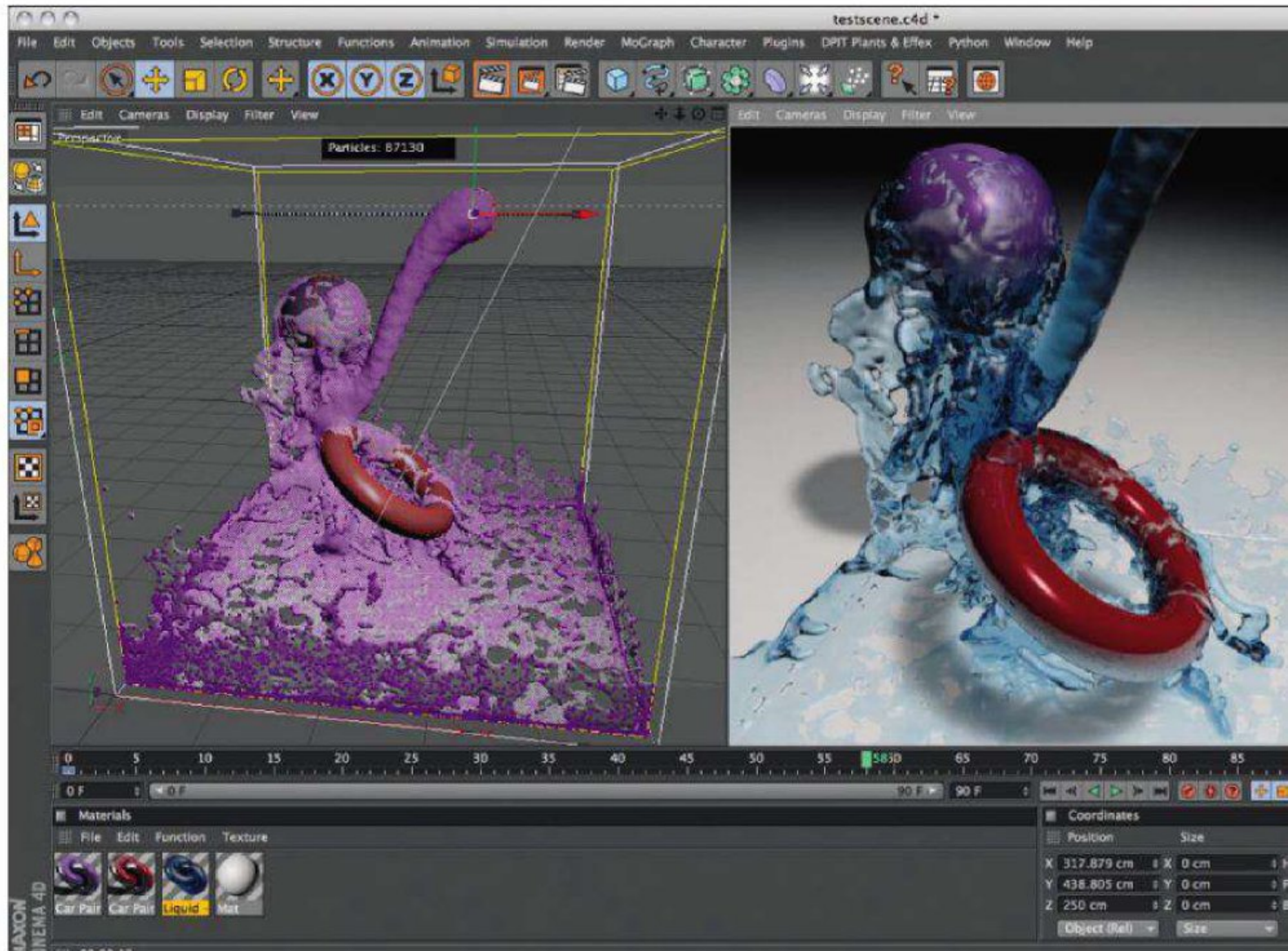• Caching for NET
  Render support

DEVELOPER

Katachi – Graphics
& Plugins

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dpit2.de

About the author
Steve Jarratt has
been reviewing
creative CG
software since
the early days
of 3D World, and now has the
pleasure of being its editor
3dworldmag.com

DPIT Effex 1.5

By adding variable-viscosity liquids to its fluid dynamic core, this plug-in fills a hole in Cinema 4D's armoury, says __Steve Jarratt__

The last time we looked at Katachi's Nature Spirit plug-in was version 3.1 back in 2006. Back then, it was busy evolving from a tree generation tool to include instances, a terrain-creation system and dynamics. A year later and DPIT 4.0 gained a fluid dynamics system for smoke and fire effects, hair creation tools and a physical engine for atmospheric effects and skies.

To rationalise this increasingly diverse toolset, DPIT has now been split into three plug-ins: DPIT Plants, DPIT Effex and the upcoming DPIT Enviro. It's the latest upgrade to Effex that's of interest here.

Version 1.0 introduced smoke and fire generation, and this update builds on this with an improved fluid core and an oxygen combustion mode, enabling you to create flamethrowers or fire-breathing dragons on top of the usual turbulent smoke clouds. This aspect of the plug-in isn't our focus here, but suffice it to say that it's possible to create beautiful and extremely realistic smoke and fire with the minimum of fuss. The effect is represented in the viewport in near-realtime, and the rendered results are gorgeous.

With this base fluid dynamics system in place, developer Samir Kharchi has

now added the ability to create liquids, reproducing anything from low-viscosity materials, such as water or oil, right up to high-viscosity substances including cream, toothpaste or gels – and even mixed-viscosity materials in the same simulation.

SIMULATION SETUP

Setup is much the same for either type of fluid simulation: in this case, simply select Create Liquid Setup and a volume is generated containing an emitter object linked to the Liquid Solver. At this stage, if you hit the Play button, particles are produced and slosh around the volume in a distinctly liquid fashion. However, to generate a visible object you need to add a

Fluid Mesher to the solver, which generates a mesh based on the particles' location.

Tweaking this mesh is relatively straightforward, with control over the Surface Reconstruction and Grid Smoothing to help reduce the usual blobbiness that accompanies meshed liquid simulations. It also features a clever system for cutting the mesh at obstacles, so you get a much smoother edge where the particles collide with selected objects or the flat sides of the volume. The Fluid Mesher also works with all other types of particles supported within Cinema 4D.

Naturally, it's the standard balancing act between mesh smoothness and detail, but invariably the higher the grid resolution,
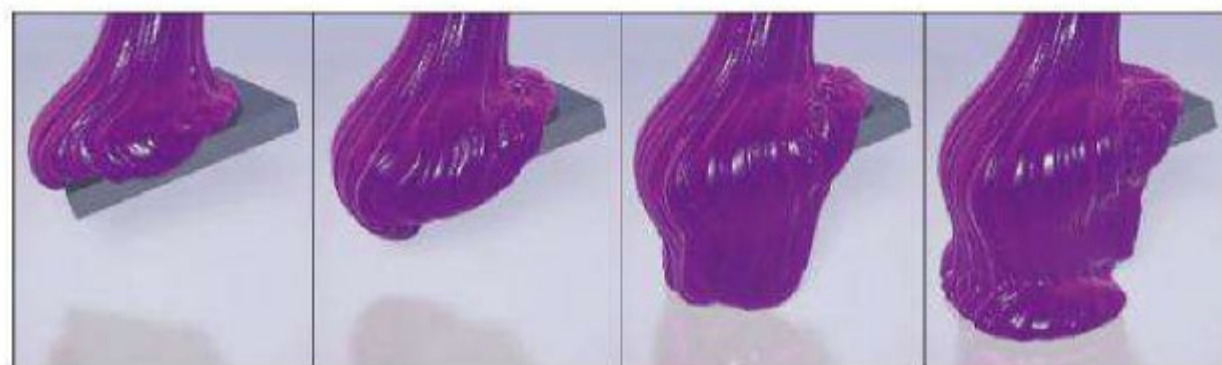
■ Thick, highly viscous materials take longer to simulate, but the end results – complete with realistic coiling and buckling – are well worth the wait

■ By increasing the pressure value you can have liquids spurting out of the emitter, or practically exploding

■ DPIT Effex puts fluid simulation right in the Cinema 4D interface, enabling you to change materials and perform test renders with ease

▶ Viscous 'water' liquids run and dribble, cling to surfaces and break apart in a realistic fashion

the larger the number of particles, and the denser the mesh, the better the end result. Accordingly, you'll need some decent hardware to make the most of DPIT Effex – or plenty of patience.

Effex provides a system for creating foam, based on the curvature of the underlying mesh. These particles can be used to generate a secondary mesh, or it can produce Thinking Particles, which can be rendered separately. Good-looking results take some time to arrive at, but the effect really adds an extra dimension to fast-moving, splashing liquids. Of course, a second round of particle generation also adds an overhead to your simulation, so it's best to cache the original mesh and generate foam from that instead.

Obstacles can be used to divert the liquid flow, which is done by adding an Obstacle Object to the solver and either choosing from the default primitives or selecting Mesh and linking it to an object of your own making. The system currently requires objects at least three grid cells thick in order to work, and results aren't always that accurate. Fortunately, Kharchi is already working on a more precise polygon-based collision system.

MIXING YOUR LIQUIDS

Another key feature of the plug-in is its ability to do variable viscosity simulations, and to mix them in the same scene. The only real drawback is that thick, gooey materials such as toothpaste or jelly take much longer to simulate because of the

algorithms needed to describe the action of the particles as the substance buckles and coils. But it's well worth the wait, because the results are incredibly realistic.

Probably DPIT Effex's biggest advantage is also its biggest drawback. Being hosted within Cinema 4D means that familiar workflows are supported, and you can get instant feedback in terms of swapping materials and test renders. You can also use DPIT Effex with Hair and MoGraph to create some amazing visuals.

But being tied to a single app also limits the plug-in's utility. A major issue is that while particle and mesh simulations can be cached to help speed up workflow and support NET rendering, you can't use these caches anywhere else – meshes can't be saved out as OBJs for example, which would really extend its usefulness in studios not confined to C4D pipelines.

As with any app that replicates complex systems, decent results are fairly instant, but excellent results can take some time to achieve. Given that you have so many variables to cope with, getting the perfect result still takes experimentation. It's a situation that isn't helped by a lack of documentation (at the time of writing, the built-in Support Center only provides a basic description of the various functions, and while there are a few tutorials and scene files available, a proper manual would greatly reduce the learning curve).

DPIT Effex is an undeniably powerful and well implemented plug-in. You won't get the flexibility and performance of a dedicated app such as RealFlow with its huge range of Daemons and options, but then Effex is a third of the price.

If you rely on Cinema 4D to do VFX work, illustration or motion graphics, adding this plug-in to your pipeline seems like a smart (and fun) thing to do. DPIT Effex 1.5 opens up all sorts of possibilities, and despite a few niggles, is a hugely impressive piece of code that not only extends Cinema 4D's functionality, but also its general appeal as a CG tool. ●
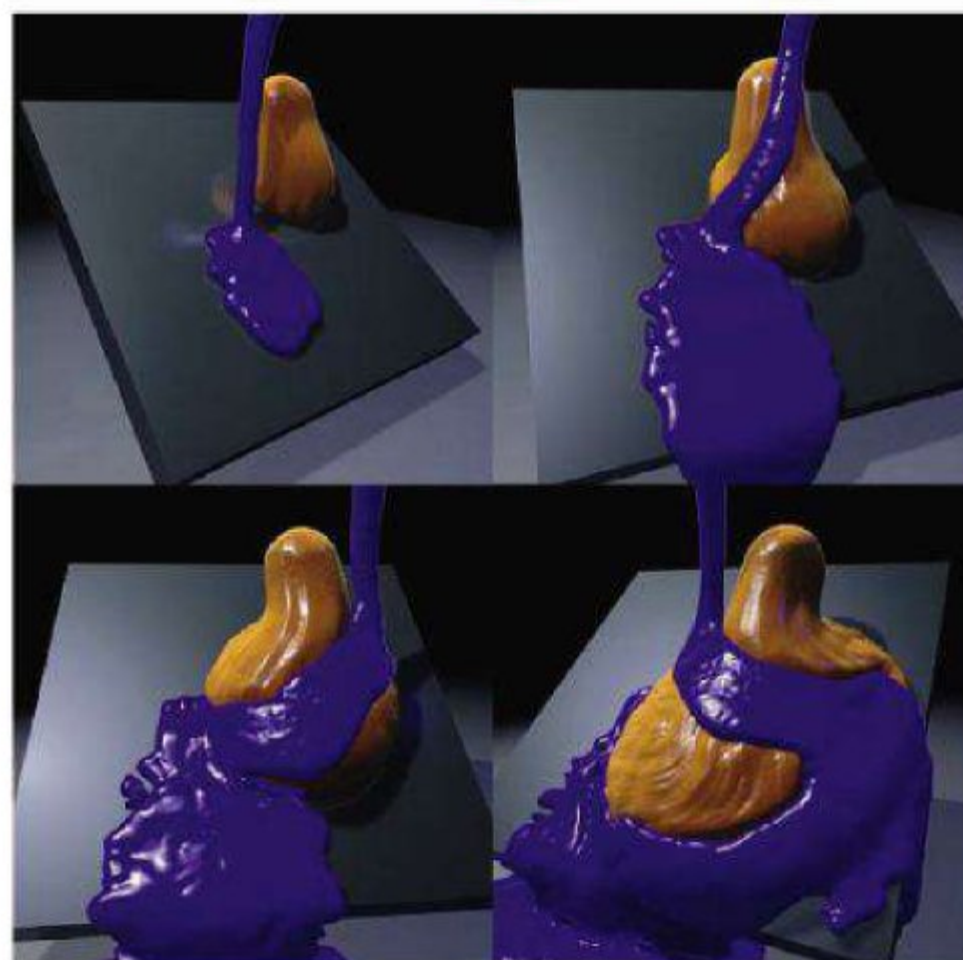
3D VERDICT

PROS
- Easy to set up, simulate and render
- Fluid mesh simple to edit and tweak
- Results can look fabulous

CONS
- Needs a powerful machine and lots of RAM
- Meshes can't be saved out separately
- Better documentation would be welcome

Once you're up to speed with its many controls, DPIT Effex opens up all sorts of avenues – the ingenious C4D artist will no doubt generate some amazing results

■ DPIT Effex can handle multiple liquids of varying viscosity in one simulation, each reacting to the other

Software
Animation and rendering application

PRICE
- Basic
  $499 / £307 / €365
- Pro
  $1195 / £736 / €874
- Basic Upgrade from
  4.5 Basic
  $199 / £123 / €146
- Pro Upgrade from
  4.5 Pro
  $249 / £153 / €182
- Pro Upgrade from
  4.5 Basic
  $449 / £277 / €328

PLATFORM
Windows / Mac (WINE) / Linux (WINE)

MAIN FEATURES
- Powerful rigging tools
- Extremely fast animation feedback
- Mature expression engine
- Arnold-based rendering engine
- Community support

DEVELOPER
pmG Worldwide

WEBSITE
projectmessiah.com

About the author
William Eggington has been working in 3D animation for over a decade, and runs his own studio supporting the animation and broadcast industries
eggington.net

■ messiah:studio's surface displacement capabilities work well with sculpts from ZBrush and don't fear high polygon counts
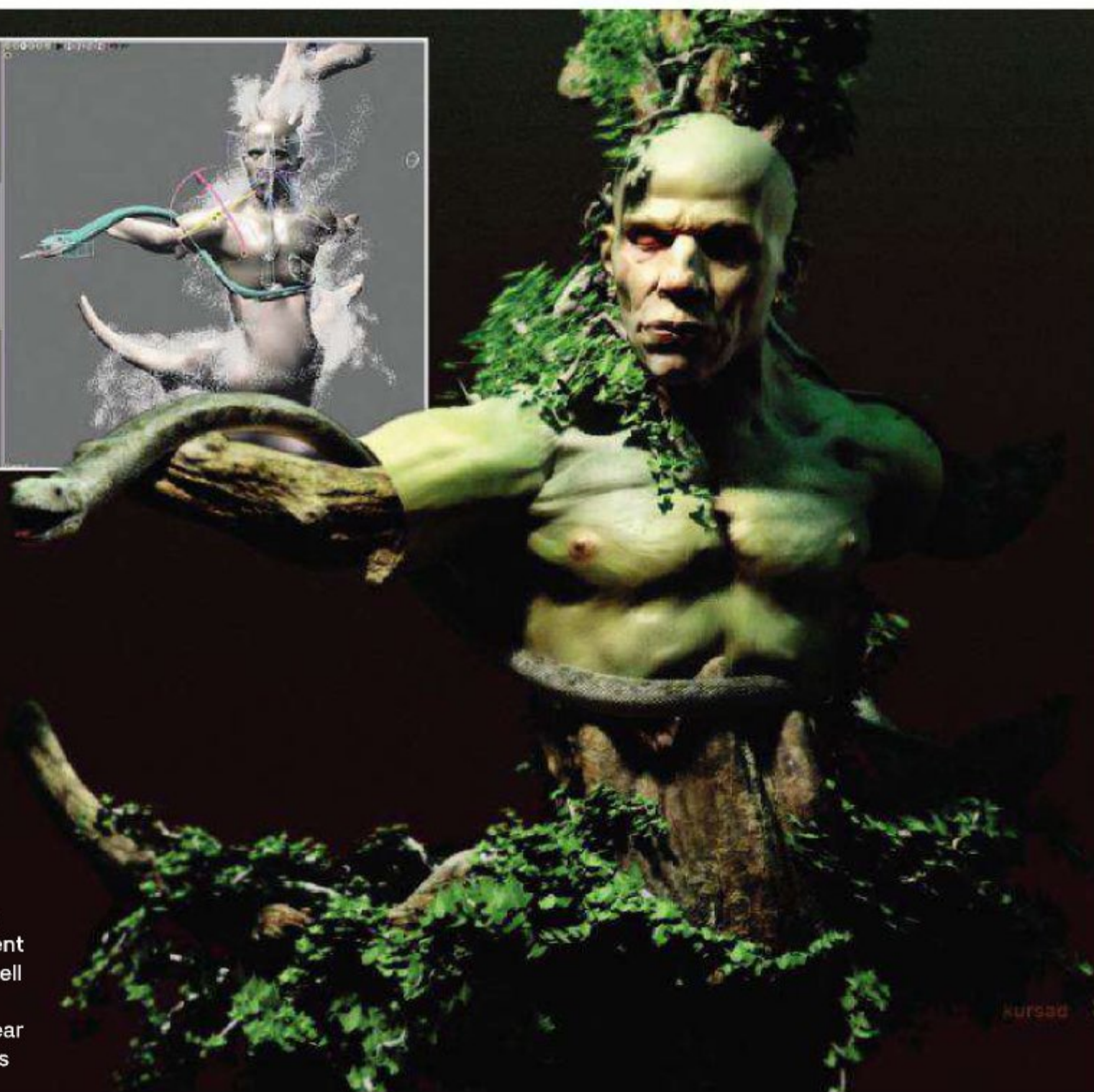
*Image by Kursad Karatas (**plexxus.com**)*

messiah:studio 5.0

William Eggington discovers a flood of exciting new tools for this long-standing package with a devoted user base

Celebrating its 10th anniversary under this brand, messiah:studio is an animation and rendering tool for artists who want raw access to the inner workings of their own creations, without having to learn programming languages or mortgage their house for a single licence. Since its beginnings as a plug-in for LightWave 5.6, messiah's interface has always emphasised giving animators direct access to what they need: the motion curves and dope sheet editor of the item or items currently selected.

Backing the interface focus is raw interactive performance that's unmatched in any other application I've seen. High-polygon meshes with extremely complex rigs respond to the animator's nudging or gross movements that seem to magically ignore their complexity, giving you a direct experience and, for the most part, removing the need for constant playblasts to review your motion in real time.

messiah developer pmG has stayed busy in recent years, implementing new technologies such as direct 'on the rig'

armature controls, soft body dynamics, hair, point-level animation, native endomorph support, auto-rigging, and a host of expressions that provide even more tools for your character rigging needs. Building on the renderer's 'Arnold' code base are huge improvements in Global Illumination noise reduction, a growing library of shaders, volumetric particles and render groups that have vastly improved the renderer into what is now a solid production-worthy tool.

VERSION 5 INNOVATIONS
With the release of version 5.0, pmG has added a host of new features and improvements. Some of these are long-awaited fixes to workflow issues, but a lot of them are innovative enough to push messiah:studio back into the spotlight.

2D animators often struggle with transitioning into 3D space, thanks to a lack of tools to help them utilise their existing skills: planning a composition, timing and providing feedback to other animators, which one gets when things

are simplified down to a 2D plane and one sheet of paper per frame. With the new Sketch mode in this release, animators can now plan out motion and block in where and, more importantly, when they want it. The Sketch layer has several tricks to aid in that process, including being able to define colour, line thickness and layer transparency, whether it's a foreground or background layer. To me, the most exciting feature of Sketch mode is the ability to save out a sketch independently of the scene file. This allows me to simply email my feedback to an artist in a tiny attachment, and they know exactly what I need from them. Brilliant.

While it's not a new feature, Parent in Place has been greatly simplified. Its previous multi-stage process was quite cumbersome. Add in the infuriating 'feature' of not supporting Undo, and it ended up as something to work around instead of using it to aid rigging. That issue is resolved with the ability to simply middle-button-drag items in the item list: a much-needed simplification that's Undo-friendly, making Parent in Place useful once more to rigging artists.
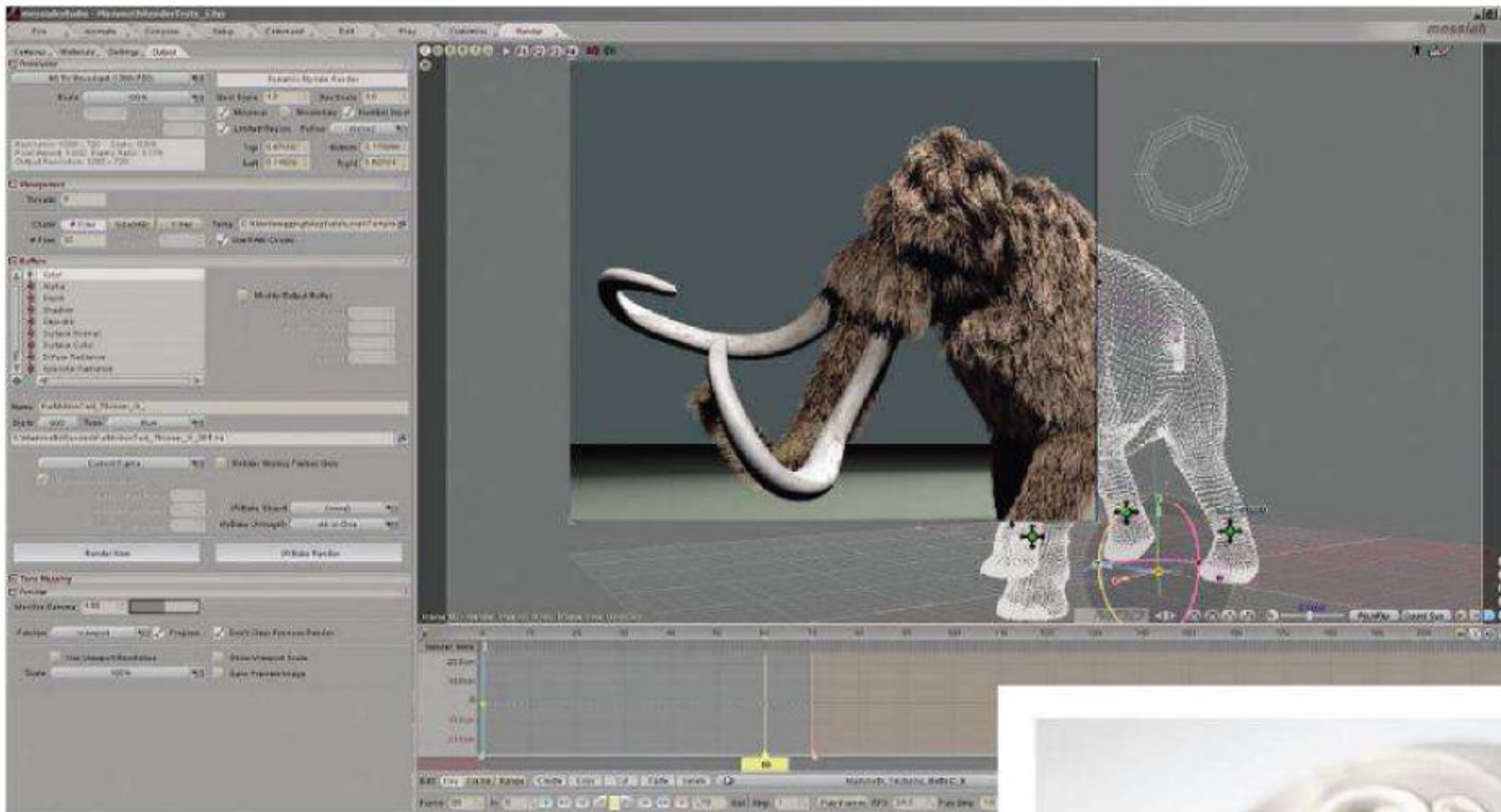
The Editsphere gets a lot of love in this release, with several fixes that make it far more intuitive to use. It now tracks the intended rotation angle and speed of your mouse more consistently and accurately. Grabbing the middle of the sphere now allows you to move the object it's controlling in 2D screen space. The

■ messiah:studio's hair guides combined with soft body dynamics allow for quite realistic hair motion

■ messiah:studio boasts a capable rendering engine alongside its polished animation tools

Image by Taron (taron.de)

newly revamped parent mode enables animators to finally see the order of rotation and which direction the object will turn if a specific axis is adjusted. It doesn't solve the issues that plague Euler-based rotation systems or the more innovative approaches I've seen in other packages, but it's a step in the right direction.

You can now visually see the actual position of the surface of your models after being translated by displacement – a welcome addition for heavy users of displacement map painting tools like ZBrush or 3D-Coat. There appear to be a few kinks to work out, but it's quite functional for a first version.

of rocks and boulders, or blood cells. The tools for using instances as particles are quite easy to use, but this new feature could stand to be followed up with some added randomisation controls, like changing surface properties per instance or random offsets to the instanced animation. As it stands, the flock of birds would all flap in unison, and new bird instances would have to be manually added for each required variation.

Hair Instancing is a fantastic new feature that will spawn countless ideas for its potential use: feathers on birds, spikes on cacti, trees in a landscape or lint on a sweater, for example. The tools

"pmG has packed in enhancements while delivering innovative new features"

DelayPoints is a neat effect that emulates a more 2D approach to motion blur. It appears to be well-implemented and easy to control; a welcome tool in the quest to make 3D animation more dynamic.

PARTICLES AND HAIR

When you require a lot of elements, using particle simulations along with object-based instancing can often do the trick. Think large flocks of birds, an avalanche

Image by Vegard Myklebust (usefulslug.com)

■ messiah:studio 5 includes new tools that are a boon to character artists

for controlling the placement, length and direction of hair in messiah have always been powerful, and utilising those controls with instanced geometry is fantastic. It does suffer a little in that there's no way to control the randomisation of anything but the most basic scale, position and rotation of the instances, but that's fairly easy to work around.

DYNAMIC RENDERS

Dynamic Update Render is a fantastic addition to messiah:studio. The ability to see the changes made to surface properties in near-real time makes transitioning to messiah's built-in renderer a much more viable option. On top of that, new tools really let you focus in on specific elements of a scene. Turning on Limited Region Follow mode enables you to track a specific object throughout your animation without having to waste CPU cycles rendering things you're not currently working on. This is a fantastic tool that I wonder how I lived without.

This is by far the strongest release to date of messiah:studio. pmG has packed in many fixes and enhancements to appease

its current user base, while delivering an ample serving of innovative new features to attract a new audience.

The software isn't perfect: there are still quite a lot of antiquated or poorly implemented features that occasionally rear their ugly heads when using the software, but with this release, you can tell that pmG is tackling them head-on, and is not ignoring its user base in any way. ●

3D WORLD VERDICT

PROS
- Fast interactive performance
- Dynamic Update Render
- Handy Sketch mode
- Displacement view in OpenGL

CONS
- Euler rotation gimbal lock
- Mac port performance is iffy
- Unattractive OpenGL view
- API is still undocumented

This release won't disappoint long-time users, with improved cross-application support to complement anyone's toolset

■ Sometimes it's the small things that matter. First implemented in version 6.7, the new Gizmo speeds up workflow by reducing the cycling of editing modes

Software
UV mapper

PRICE
Full software
• £259 / $409 / €299
One network seat
• £605 / $956 / €699
Five network seats
• £2,422 / $3,829 / €2,800
Academic licence details available on request
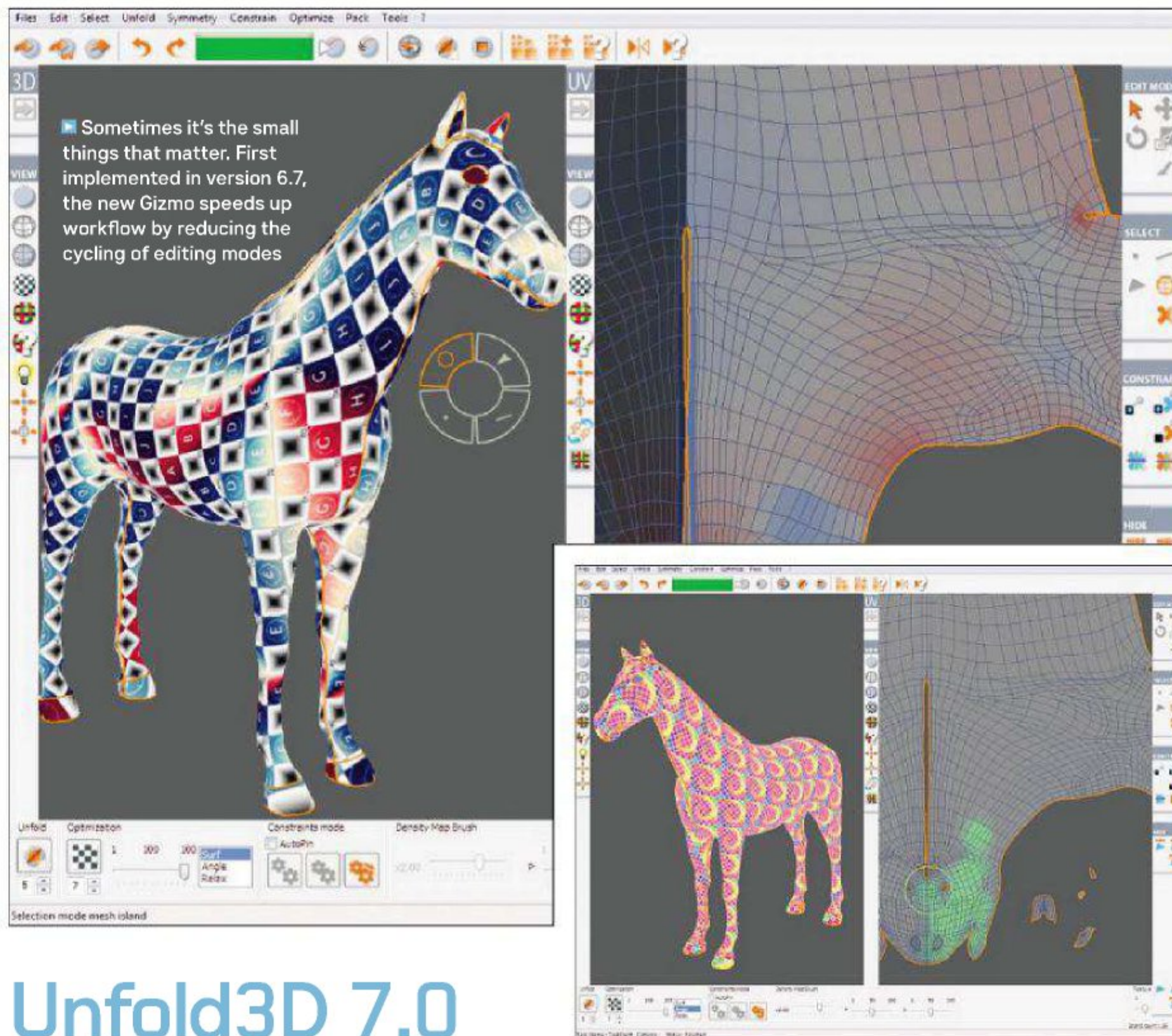
PLATFORM
Windows

MAIN FEATURES
• Speedy
• Density painting
• New Isomap unfolding algorithm
• Well documented
• New optimisation workflow

DEVELOPER
Polygonal Design

WEBSITE
polygonal-design.fr

About the author
Cirstyn Bech-Yagher is a long time freelancing all-rounder, doing anything from project management to modelling and texturing. She's still working with tutorials and startup Icicle 3D northern-studios.com

Unfold3D 7.0
Unfold3D promotes itself as the best and fastest UV Map generator on the market. Cirstyn Bech-Yagher puts it to the test

■ The density paint function makes your workflow quicker by enabling you to paint density, instead of cutting and scaling your UV map

P olygonal Design, the Marseille-based creator of one of the first UV mappers on the market, recently released Unfold3D 7.0 – a standalone UV mapper claimed to be the best and fastest available. This fresh-from-the-compiler release sports a new Isomap-based unfolding algorithm, which reduces stretching even more than its predecessors. In addition, Unfold3D now has the ability to paint density maps onto the unwrapped mesh, and offers a new surface optimisation tool. What's more, a whole load of minor tweaks have been implemented aside from the more obvious bug fixes, such as autopin; an improved stretch visualisation, which uses polys instead of vertices; and a relax function.

Old and new users alike won't have to spend too much time familiarising themselves with the interface. As with most standalone mappers, you have the 3D and cutting/welding view on the left, and your map view to the right, with toolbars on the top and sides for mapping and views. Generating a map also follows standard operating procedure: you cut your mesh, press a button and there's your

UV map, which can then be tweaked and optimised further. In addition, Polygonal listened to its users and finally mapped the C and W shortkeys to Cut and Weld respectively, following the standard from other applications.

That's where some of the similarities end. First of all, before you start mapping, you'll need to read the manual or look at some videos, because they contain vital information pertaining to your mapping process. Most importantly, mesh hygiene isn't optional in Unfold3D: it's mandatory. The program can't unwrap wires that have three or more neighbouring polys, or meshes that have butterflies. Nor will it allow relative vertex numbering (something most applications, from UV Mapper to UV Layout, enable), and you'll probably want to avoid non-convex n-gons. While a lot can be said in favour of mesh hygiene, it may not be optimal for an application to demand that you adhere so strictly to its standards without putting some tools in place to handle the exceptions – like, for instance, UV Layout has done with its Clean, Weld and New/Edit functions on import. Otherwise you may run the risk

of wasting quite a lot of the time that Unfold3D claims to save you on making the mesh compliant with the application.

Should you have a perfectly compliant mesh, you may still face another bump. If you've cut a mesh into groups and materials prior to importing them into Unfold3D and you change your mind, you'll have to go back into your modeller to fix this. Unfold3D won't modify pre-existing mesh information from the loaded OBJ file, so it won't weld back two edges together when they're marked as split, even if their coordinates match. And even if you've gone back into your app, and have attached or welded everything back together, there may still be traces of the original splits in the object file, so your best bet may be to map in Unfold3D first, and then cut your groups when you're done with the UV mapping.
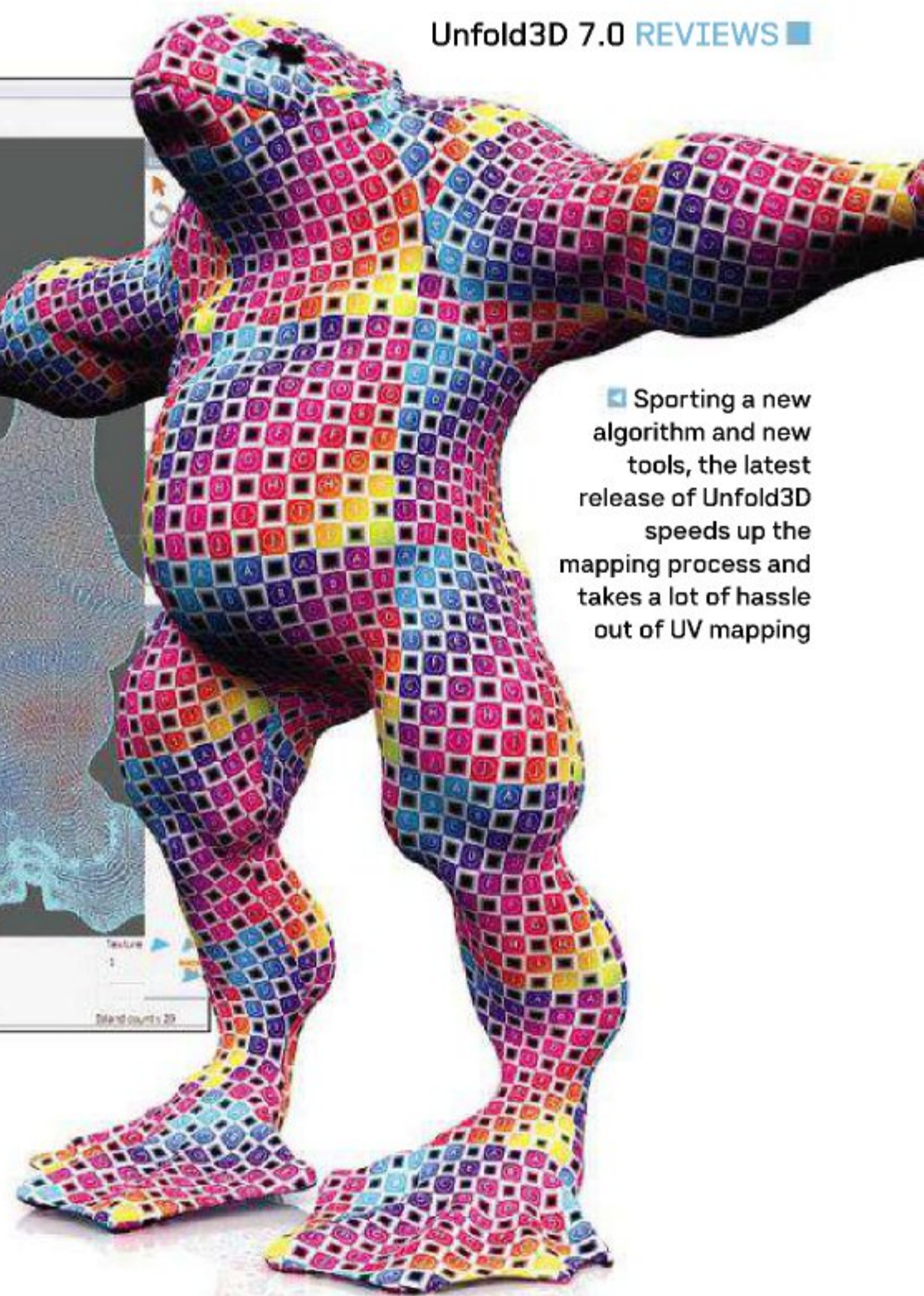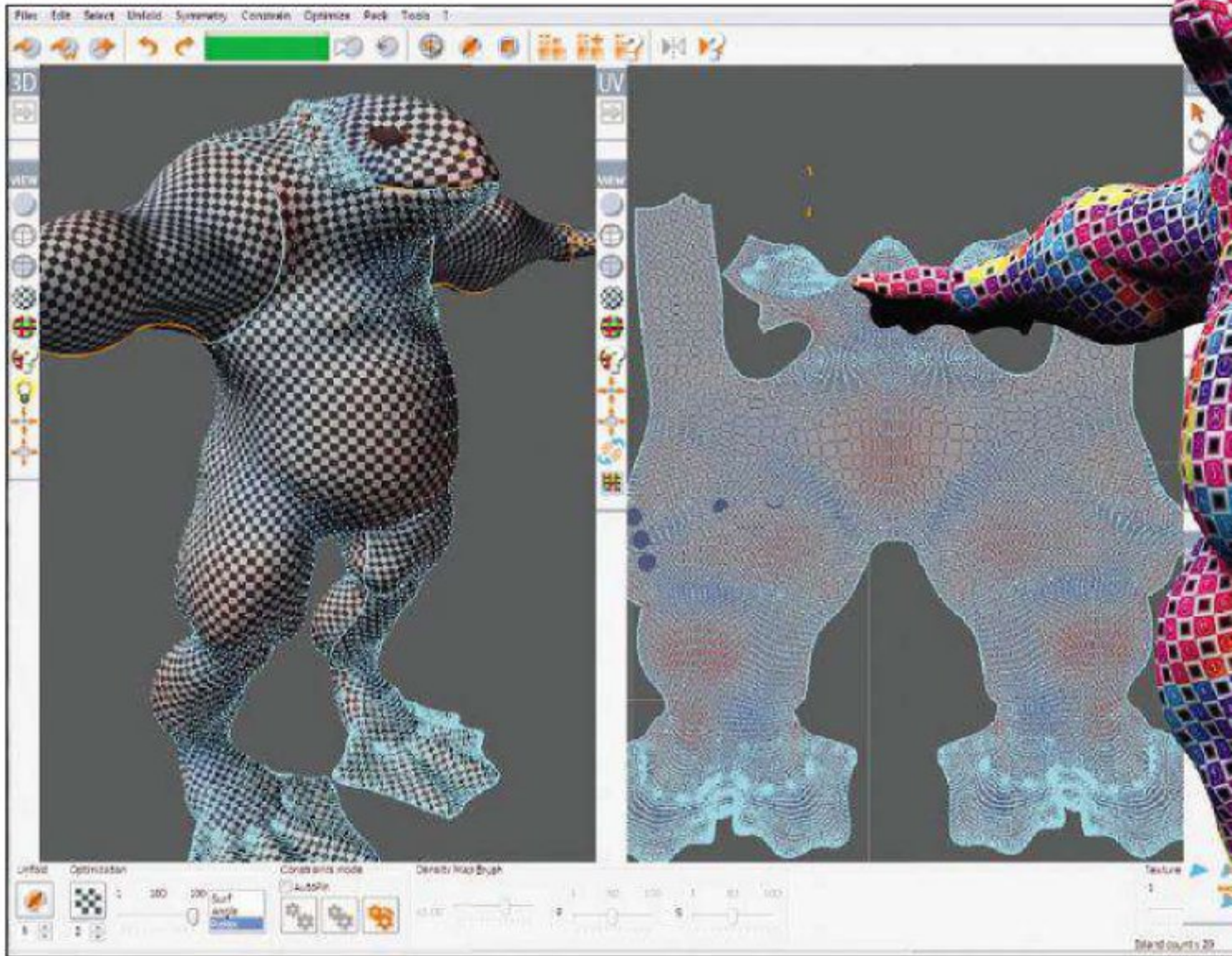
SPEED TEST
These issues aside, is Polygonal Design's claim that Unfold3D is the fastest mapper out there a valid one? In terms of workflow, it's definitely one of the speediest. Its toolkit and functionality take

■ Sporting a new algorithm and new tools, the latest release of Unfold3D speeds up the mapping process and takes a lot of hassle out of UV mapping

■ **The change in mapping algorithm also brings a new implementation of the surface optimisation tools, increasing tweakability and reducing stretch**

a lot of work out of organic or mechanical UV mapping, provided you've avoided the aforementioned mesh issues. The cutting process itself is on a par with UV Layout's, and is more intuitive, albeit a little more finicky in its use of keys and clicks. The new algorithm, however, keeps its promise and produces better UVs than earlier angle based flattening (ABF)-based incarnations.

One big standout feature in this version is the density paintbrush. After you've

the amount and type of optimisation you want to run, and one click later, your UVs are (mostly) optimised.

This release also sports tweaks and featurettes aimed at speeding up the workflow even more. The new Gizmo takes a lot of the hassle out of cycling editing modes via its Tab > mouse-click menu, and you can now also make a vertex selection grow (the old version had polygons only). In addition, the long-awaited relax function has finally been implemented, and the new point edition workflow finally enables you to add pins or edge constraints without cancelling previous work and starting over.

"One big standout feature in this version is the density paintbrush. This is an incredibly handy feature, and a real time-saver"

mapped your mesh, you can directly paint areas with increased or decreased density, allowing for either more or less detailing on the painted-on areas of the map. This is an incredibly handy feature, and a real time-saver, because it saves on cutting and increasing or decreasing the size of said cuts. It works by selecting the paintbrush after you've mapped your model, or model component, and then just painting on the areas that need more or less density. After you're done, you simply run an optimise function and voilà: more or less density on your map, with a minimum of hassle.

As with the density paintbrush, the new surface optimisation tool and workflow are also designed to save time. Post-mapping, Unfold3D will – like most other UV mappers – show you areas that still need work. The optimise toolkit makes this fast and easy. You select your area or island, define

While Unfold3D is certainly one of the fastest mappers out there in terms of workflow, unwrapping speed itself is dependent on mesh, hardware and complexity, so that's fairly hard to substantiate. As for the claim that it's the best, it may have been valid back in the day when UV mapping really was a major, and painful, chore. However, in an age when any claim of superiority is usually a matter of opinion, rather than fact, it depends on what you want and need in your UV mapping software – especially with recent years' advances in mapping and mapping tools.

Having said that, if you're in need of a good, speedy UV mapper, Polygonal Design's software is definitely worth investing in. It may lack some of UV Layout's finer features, but if you just want to map and get it over with, Unfold3D is money well spent. ●
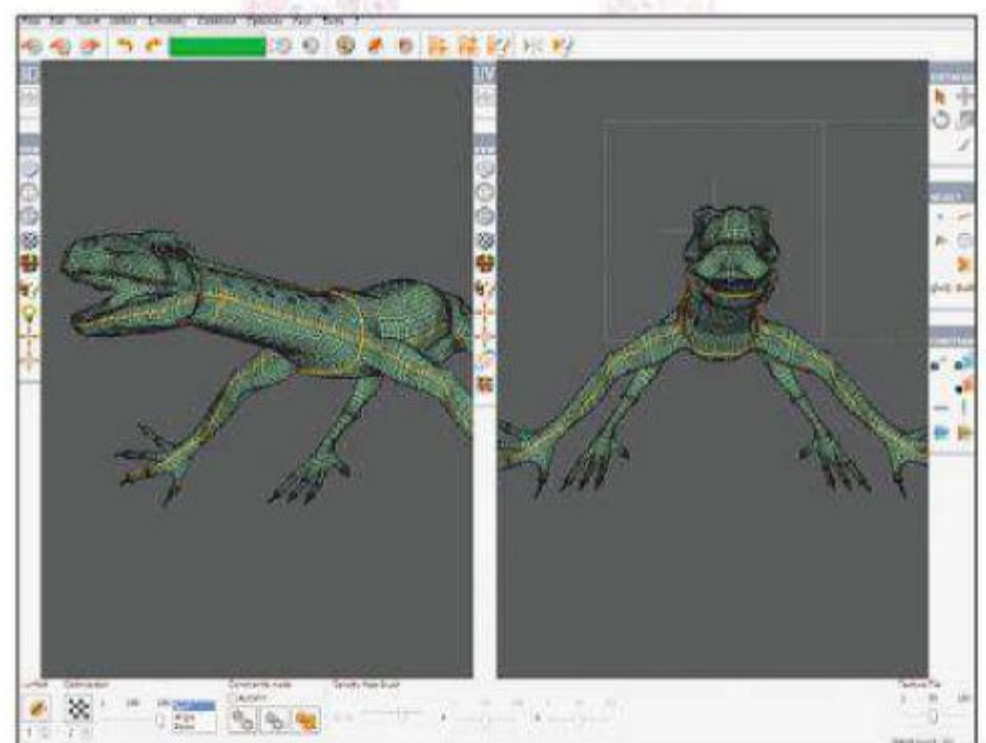
3D WORLD VERDICT

PROS
- Speedy workflow
- Density paint feature
- Solid optimisation tools

CONS
- Mesh hygiene issues
- Documentation could use an update
- Can be slow on complex mesh import

With tools such as density paint and the new unfolding algorithm, Unfold3D is definitely worth the money if you're looking for a fast, easy UV Mapper

■ The workflow in Unfold3D is fairly standard: on import, everything is grey or green, and takes colour and texture as you cut, weld and flatten

▶ Images of this quality, with soft shadows, global illumination and bloom, are available directly within SketchUp and are real-time navigable

Software
SketchUp
plug-in

PRICE
• £93 / $149 / €110

PLATFORM
Windows / Mac

MAIN FEATURES
• Real-time navigation of (almost) photo-real models within SketchUp
• Automatic UV unwrapping and baking
• Real time rendering of animations
• Uses IES profiles for accurate light rendering
• Lit models can be distributed freely

DEVELOPER
Adam Billyard

WEBSITE
light-up.co.uk

LightUp 2.0

The latest version of the lighting plug-in for SketchUp leverages the GPU to give much faster renders, says **Tim Danaher**
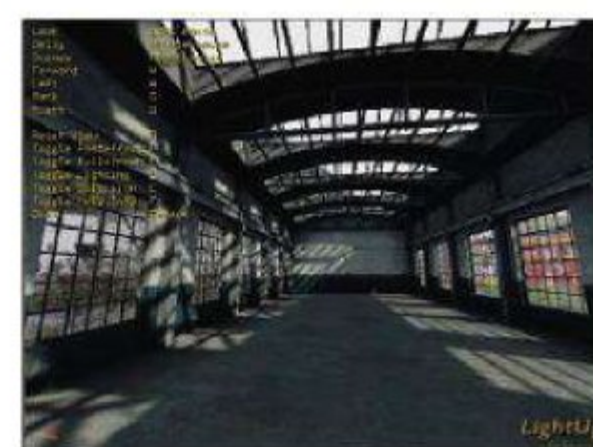
▶ The free LightUp Player app enables you to distribute wholly navigable, fully lit versions of your LightUp scenes safely

LightUp 2.0 is an amazing plug-in renderer for SketchUp, and one unlike any other out there. It applies the baking technology used by games engines to produce realistic models with shadows, lighting, reflections and global illumination effects that can be navigated in real time, directly within SketchUp. When you first see this happening, it's little short of magic.

This release is a major upgrade that packs in a slew of new features. While it still uses your computer's CPU for lighting calculations, LightUp now leverages the powerful graphics cards in today's PCs to significantly decrease the rendering time of animations. We saw even complex models rendering out in real time. Version 2.0 also lays the groundwork for offloading more of the lighting calculations to the GPU. Nearly all GPUs support real-time anti-aliasing: if yours does, you can switch it on within SketchUp to eliminate jaggies.

This feature is shared by the free, downloadable LightUp Player, which enables users to share information easily with clients. It also allows you to overlay a watermark on your file. There's one caveat, though: if you have a Mac with an ATI card in it, Apple's failure to update the drivers means that real-time anti-aliasing isn't available, and there are some problems with Player. A fix is expected soon.

EXTRA FEATURES
In addition to the standard rendering, lighting-only and Lux analysis (very useful for lighting professionals), LightUp now supports SketchUp's Color By Layer mode. There's also a 'stroke' function that mimics SketchUp's hand-drawn rendering style to some extent. Rendering of still images up to 7,000 x 5,000 pixels is now supported, and an optional depth map can also be exported for compositing purposes. Post-processing of lighting setups now includes exposure, contrast, bloom and real-time depth of field, among others.

You can now make any light source in LightUp dynamic, so it will vary over time. This can either be done by altering an intensity graph, or by applying animated bitmaps to produce effects such as open fires, candle flames and so on.

LightUp has long supported IES files. These are produced by all lighting manufacturers and enable you to load the characteristics of any lighting equipment on the market. There's an option to preview the colour and spread of the IES

light within SketchUp, and a preview when choosing the IES file itself. For the latter, new non-system dialog boxes have been implemented, and they're pretty confusing – especially if you have many hard disks.

In addition to skyboxes and HDR images, LightUp now has a physical sky option. This uses the current SketchUp time to set the sun position. As the time of day changes, so do the characteristics of the lighting, producing an extremely realistic feel to the images, with red glows at sunset and sunrise, for example.

With all these new possibilities, LightUp 2.0 is a great upgrade to an amazing piece of software, and we await the plug-in's future features with keen interest. ●

3D **VERDICT**

PROS
• GPU-accelerated rendering of animations is a huge workflow improvement
• Real-time anti-aliasing and depth of field
• Great new physical sky model
• Free LightUp Player application

CONS
• Confusing dialog boxes
• Problems with Mac/ATI card combinations

A major upgrade to an already impressive plug-in, the numerous new features in 2.0 offer more possibilities for LightUp users

About the author
Tim Danaher is a veteran 3D artist based in Cologne, Germany, where he teaches 3D at the International School of Design and specialises in architectural projects
vizarch.blogspot.com

▣ The dialog boxes allow for previews of IES lights, but they can be confusing

Caption: With City Kit installed in Cinema 4D, huge cityscapes are just a few clicks away
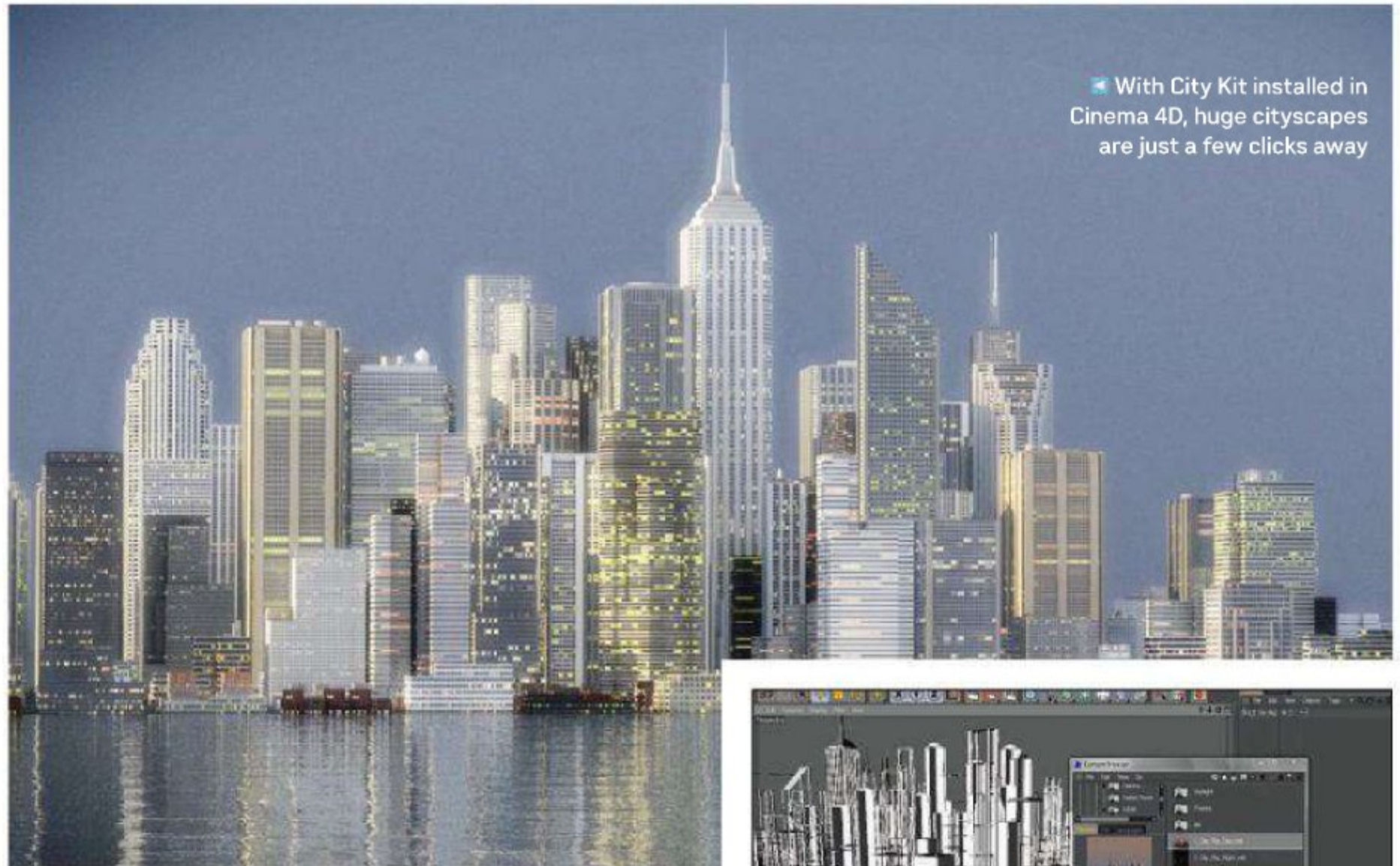
City Kit

Rob Redman investigates city building software with a look at the newest kid on the block

The ability to click a button and fill your 3D scene with a realistic cityscape is one that has been sought after for a long time. In recent years, several products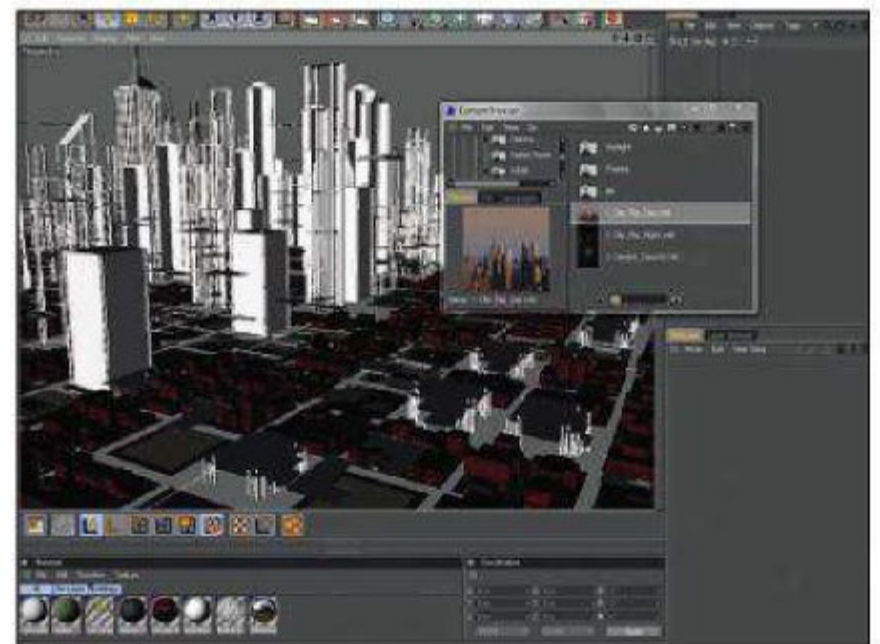 have been developed with this in mind, including plug-ins that add this kind of functionality to existing host software. Cinema 4D had one such plug-in in the form of Citygen, but unfortunately the developer ceased to write updates.

This is where GSG's City Kit comes in. Written by motion artist Nick Campbell

and XPresso expert Chris Schmidt, it's a streamlined, efficient and intuitive plug-in built predominantly using Cinema 4D's XPresso system, with all the controls accessible through the Attribute Manager. Power users can access inner workings directly in XPresso's node-based editor.

City Kit includes three presets you can load from the Content Browser. All look good, even if their style is a little clichéd, and are easy to adjust for adding your own creative input.

CLOSE CONTROL

There are two features of the kit that stand out. First off is the ability to choose day or night-time. If you wanted to create city set extensions that would be composited for different times of the day, this feature alone makes the purchase worthwhile. City Kit comes with a pair of lighting rigs for night and day, and the developers have even thought to provide rigs for linear or non-linear workflow.

The second noteworthy feature is control over Downtown, the developers' term for the area with the heaviest density of skyscrapers. There are a few methods for doing this, with the ability to randomly or controllably create more developed areas of the city, with nice falloff into the high-rise areas. You can also easily choose to leave a section of the city bare, for adding in your own hero objects.

Rendering is a breeze and texturing is all handled for you, leaving you to set the

The kit comes as a .lib4d file, enabling easy access to presets via Cinema 4D's Content Browser window

scene and click Render. The whole city is built with efficiency in mind and renders quickly, even with high GI settings.

The main downside to City Kit is that it may well lead to a surge of rather similar-looking cities. The selection of buildings could be larger and, as yet, there's no option to generate your city on a mesh, meaning all cities are flat. But this is the first release, and the creator has said that future releases will see this feature added. Matte painters may find it useful for distant shots, although the textures and models start to fall down at mid-range.

3D VERDICT

PROS
• Intuitive interface
• Good-looking results
• Low price point

CONS
• Can't populate cities across a mesh
• Small variety of buildings and textures

This will be a surefire hit for Cinema 4D users looking for a quick and easy way to create good-looking cities or add backdrops to MoGraph projects

About the author
3D World technical editor Rob Redman has been a 3D artist and trainer for many years, working for clients such as Katy Perry, Royal Mail and Daft Punk
3dworldmag.com

Caption: Simple sliders control all the aspects of your city, with a switch to show a preview for dense meshes

■ This IPW-Ci7 configuration uses Intel's latest quad-core processor, clocked to 4.4GHz to deliver maximum value

Hardware Workstation

PRICE
- £1,399 / $2,269 / €1,659

MAIN FEATURES
- 3.4GHz Intel Core i7 2600K CPU, clocked to 4.4GHz
- 8GB PC3-10600 DDR3 SDRAM
- 1GB NVIDIA Quadro 2000 graphics
- 60GB OCZ Vertex 2 SATA SSD
- 1TB Western Digital Caviar Black SATA hard disk
- Sony Optiarc AD-7260S 24x DVD rewriter
- Windows 7 Professional 64-bit
- Ports: 2 x USB 3, 14 x USB 2, 1 x LAN, 2 x eSATA, 2 x FireWire, microphone input, 7.1 surround audio output, optical audio input and output
- Warranty: Three years return to base

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About the author
James Morris has tracked the rise of every new development, from OpenGL accelerators to multi-processor workstations, over more than 15 years of testing 3D content creation hardware

InterPro IPW-Ci7

It's InterPro's turn to take you to the Sandy Bridge as James Morris assesses its workstation with the latest Intel processor

Intel's latest Sandy Bridge processor generation has already impressed us in the shape of Scan's 3XS 2600K (Reviews, issue 140). Despite being currently only available in a quad-core configuration, it packs a lot of power for the money, and readily runs above its standard clock speed. With the IPW-Ci7 Sandy Bridge, InterPro is also taking full advantage of the potential.

This IPW-Ci7 configuration uses the top Core i7 2600K version of the new processor range. By default, this quad-core CPU runs nominally at 3.4GHz, but incorporates Intel's Turbo Boost so can increase to 3.8GHz when only a single core is in use, and to 3.5GHz when all four cores are active. However, InterPro has permanently clocked the CPU at 4.4GHz, guaranteed for the three years of the return-to-base warranty.

Intel's Hyper-Threading technology is also included, so each physical core is presented as two virtual ones, meaning the processor can run eight threads simultaneously. It's not as powerful as eight real cores, but still gives a tasty performance boost for multi-threaded tasks – particularly 3D rendering.

The processor is allied with 8GB of PC3-10,600 DDR3 SDRAM supplied as two 4GB modules, so two DIMM slots are left free for upgrades. Unlike previous top-

end Intel Core i7 processors, the 2600K's memory bus is only dual- rather than triple-channel.

The most significant new feature of Sandy Bridge – the graphics accelerator built into the processor core itself – won't be that important to a workstation user. Instead, InterPro supplies the increasingly ubiquitous NVIDIA Quadro 2000, the mid-range card from the company's Fermi range. This sports 192 CUDA processing units, the same as the previous-generation high-end Quadro FX 4800. A healthy 1GB of GDDR5 is included, but as the memory path is 128-bit, the bandwidth available is only slightly more than the earlier mid-range Quadro FX 1800. It has twin DisplayPort and single DVI-I connections.

Storage comes in the now-standard arrangement of an ultra-fast disk for operating system and apps and a larger standard disk for data. Respectively, these are a 60GB OCZ Vertex 2 solid-state disk and 1TB Western Digital Caviar Black 7,200rpm hard disk. The former is very fast, but is on the small side, while the latter should provide sufficient capacity for most 3D content creation tasks. There's no memory card reader included, so the Sony Optiarc 24x DVD rewriter is the only removable storage supplied.

With the Sandy Bridge processor and NVIDIA Fermi graphics, this IPW-Ci7

promises dependable abilities for rendering and modelling. The rendering score of 8.34 in Cinebench R11.5 is ahead of most other quad-core single-processor systems we've seen, except Scan's 3XS 2600K, which uses the same processor clocked permanently to 4.5GHz. The result is not far behind six-core workstations such as Scan's 3XS 3D (Reviews, issue 134) or Armari's F4e-KO (Reviews, issue 136), either. The Cinebench OpenGL score of 44.63 is also impressive, although not to quite such a degree.

Although the processor's current quad-core limitation means it doesn't quite trounce older six-core Intel CPUs, this IPW-Ci7 still provides more bang for your buck. The slightly better performance of Scan's frequency-enhanced 3XS 2600K make it a mildly better deal over all, but this is still an extremely good-value entry-level workstation. ●

3D VERDICT

PROS
- Fast rendering for the money
- Commendable OpenGL performance
- Keen price

CONS
- Quad-core only
- Small boot disk
- No memory card reader

InterPro's Sandy Bridge IPW-Ci7 shows again the power of Intel's latest CPU range

186

"While there's an art to looking sideways, it's more of an art to keep your eyes locked ahead."
Ian Coyle, see page 54

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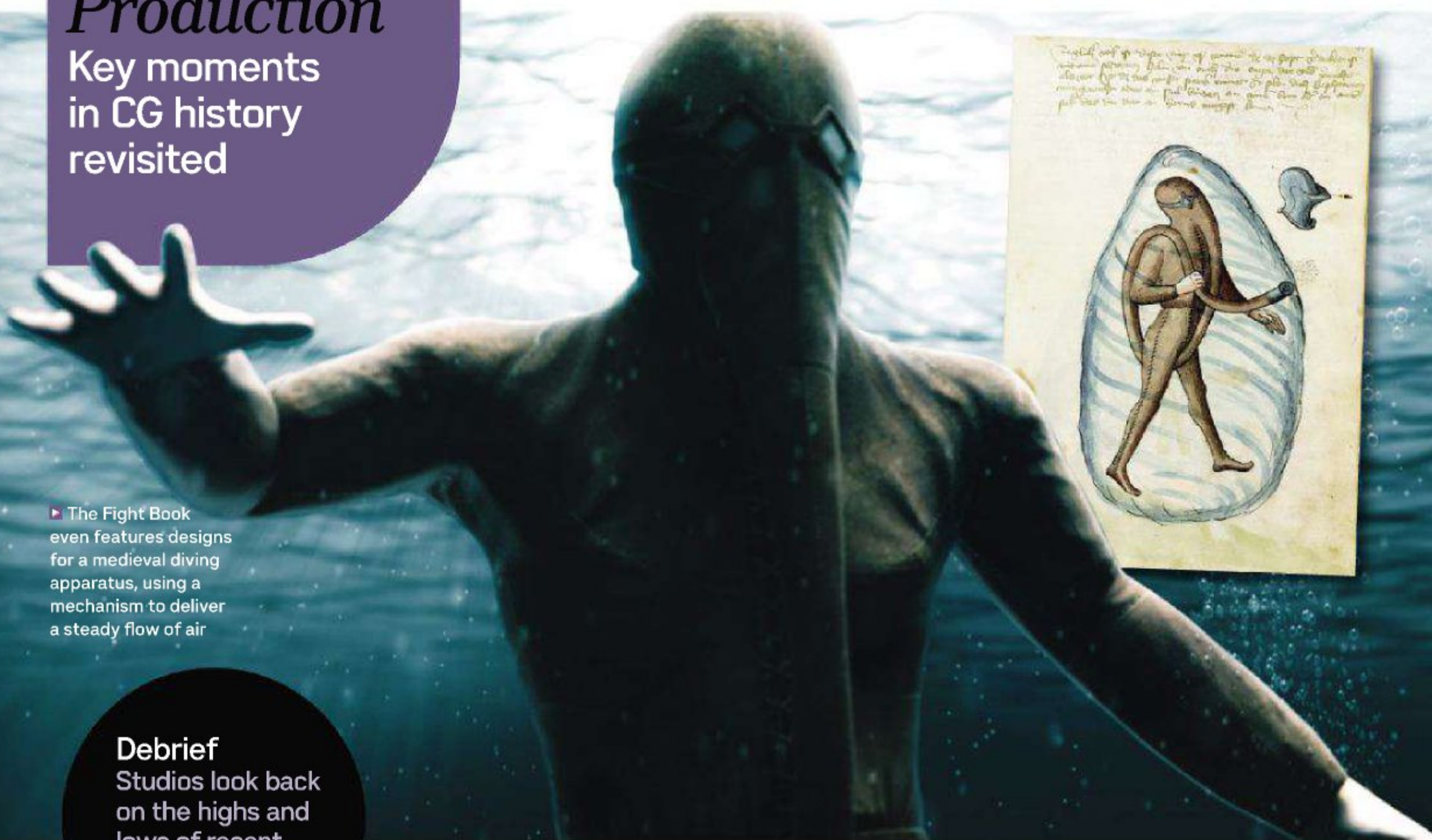
HOPE

+3D WORLD

▶ The Fight Book even features designs for a medieval diving apparatus, using a mechanism to deliver a steady flow of air

Debrief
Studios look back on the highs and lows of recent commercial jobs

VITAL STATISTICS
Title: Medieval Fight Book
Format: Cinematics for a TV documentary
Client: Wild Dream Films for National Geographic Channel
Studio: Yafka
Directors: Stuart Clarke, Antonis Kotzias, Andrew Helmis
Project length: Six weeks
Team size: Five
Software used: LightWave, Cinema 4D, 3ds Max, ZBrush, Photoshop, After Effects

About the author
Antonis Kotzias is an Emmy-nominated VFX CG supervisor, and the owner of animation and VFX studio Yafka. He has worked in London, Glasgow, the US and Sydney across a range of media. Happy Feet, Charlie and the Chocolate Factory and Harry Potter rank among his credits.
www.yafka.com

Rules of combat

Yafka's CG supervisor, <u>Antonis Kotzias</u>, talks about bringing a rare, ancient tome back to life for National Geographic's recent Medieval Fight Book programme

Wild Dream Films, a long-term client of ours, had a documentary project lined up for the National Geographic Channel based around a medieval manuscript called the Fight Book. Dating from 1459, comprised of 150 paper folios and written in Swabian dialect, it's one of the medieval world's most mysterious manuscripts. Contained within its beautifully illustrated pages is imagery of bloody combat, war machines, weird inventions and judicial duels.

Wild Dream wanted us to bring many of these elements back to life in a series of CGI cinematics for their programme. Our task was to create around 30 HD shots depicting medieval duels, siege engines, an ancient diver and other elements from the book.

We had around 45 days to complete the task, and during that time the studio was also involved in a feature film and another documentary project for a different production company. So, to meet this challenge, we brought two additional character animators on board: Nikolas Karatasakis and Orestis Konstantinidis, both fresh graduates from Animation Mentor. Andrew Helmis was our senior CGI artist and Nick Deligaris was our character supervisor.

We mainly use LightWave 3D, but adding fresh talent to the team required us to widen
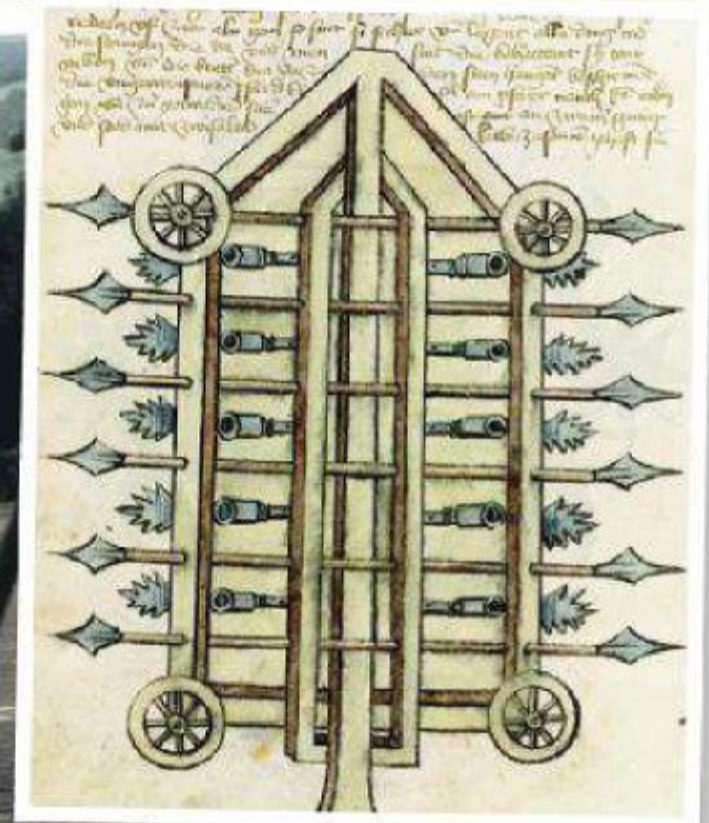
▼ Menacing explosive mines attached to ropes are one of the book's proposed castle defence systems
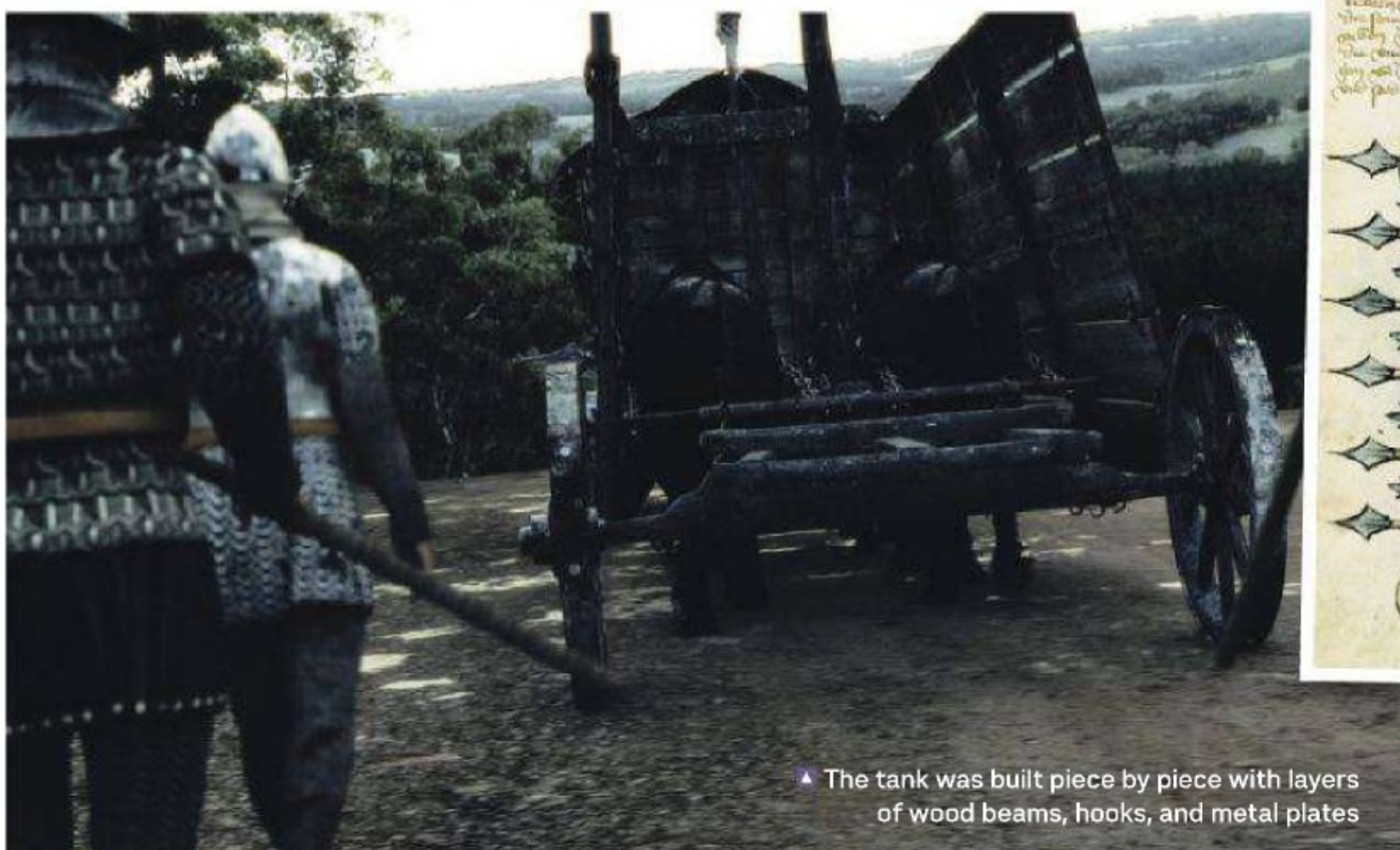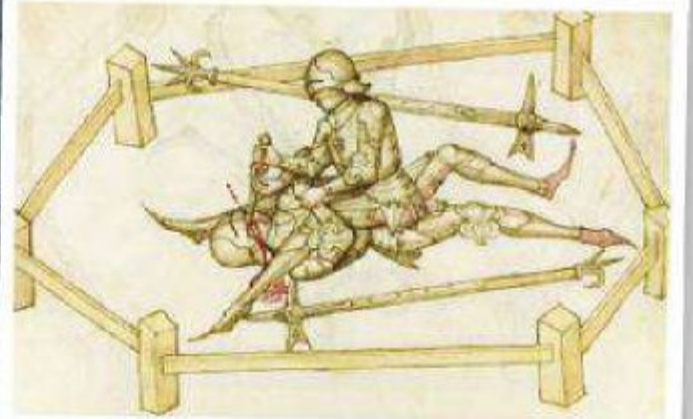
▲ The tank was built piece by piece with layers of wood beams, hooks, and metal plates

◼ The team had to base their 3D models and designs on these pages, which were taken from the medieval manuscript

our pipeline. Cinema 4D was used to rig and animate the knights, which were exported to LightWave, where they were rendered and effects were added. Some of the shots, such as the tank one, were rendered with V-Ray through 3ds Max, and ZBrush was used for the diver. Finally, we did all our compositing and colour correction in After Effects.

We wanted to exceed the quality limits the timescale and budget might suggest, as well as give the client much more than expected. We also wanted to present a cinematic visual style as opposed to common documentary CGI aesthetics. Thankfully, the theme of the project appealed to all our team members, which allowed everyone to work long hours with relative ease.

What we did right
1. We kept it simple
We made efforts to keep the quality high and avoid experimenting with new techniques as much as possible. Each CG artist had to do a

minimum of R&D, since the tasks they were assigned suited their individual expertise. At the same time, the work was planned in such a way that no time was wasted waiting for assets to be finished. In most cases, we used HDRI environment maps and did some simple image-based modelling. If we had a model or a character from a previous project, we would use that and simply update it accordingly. The fact that we had to deliver quickly and use more than one application in our pipeline was enough to keep us away from techniques that weren't production proven.

It's tempting for CG artists to take their time and make everything perfect, but we felt that if we tried that approach, we would simply fail. Instead, we managed to match or exceed the quality requirements and the time saved allowed us to render everything with non-interpolated radiosity, photoreal motion blur and reflection blur. The only new thing that we used for the first time was a linear workflow for all our lighting and texturing.

2. We requested creative freedom
Early on in the project, we communicated to the client that five to six minutes of animation involving a lot of characters and VFX in HD would be difficult to achieve in the time frame we had available. Stuart Clarke, the project's director, understood that, and after providing a brief guideline on what he wanted to see, he let us direct the CGI shots ourselves. Half of these were directed by me and the other half by Andrew Helmis, which allowed us to know what was needed. This saved us a lot of time in building assets, since we knew what level of detail would be exposed on camera. The same principle applied to many of the visual effects shots – it was easier to direct a scene while bearing in mind what effects we would need to add later.
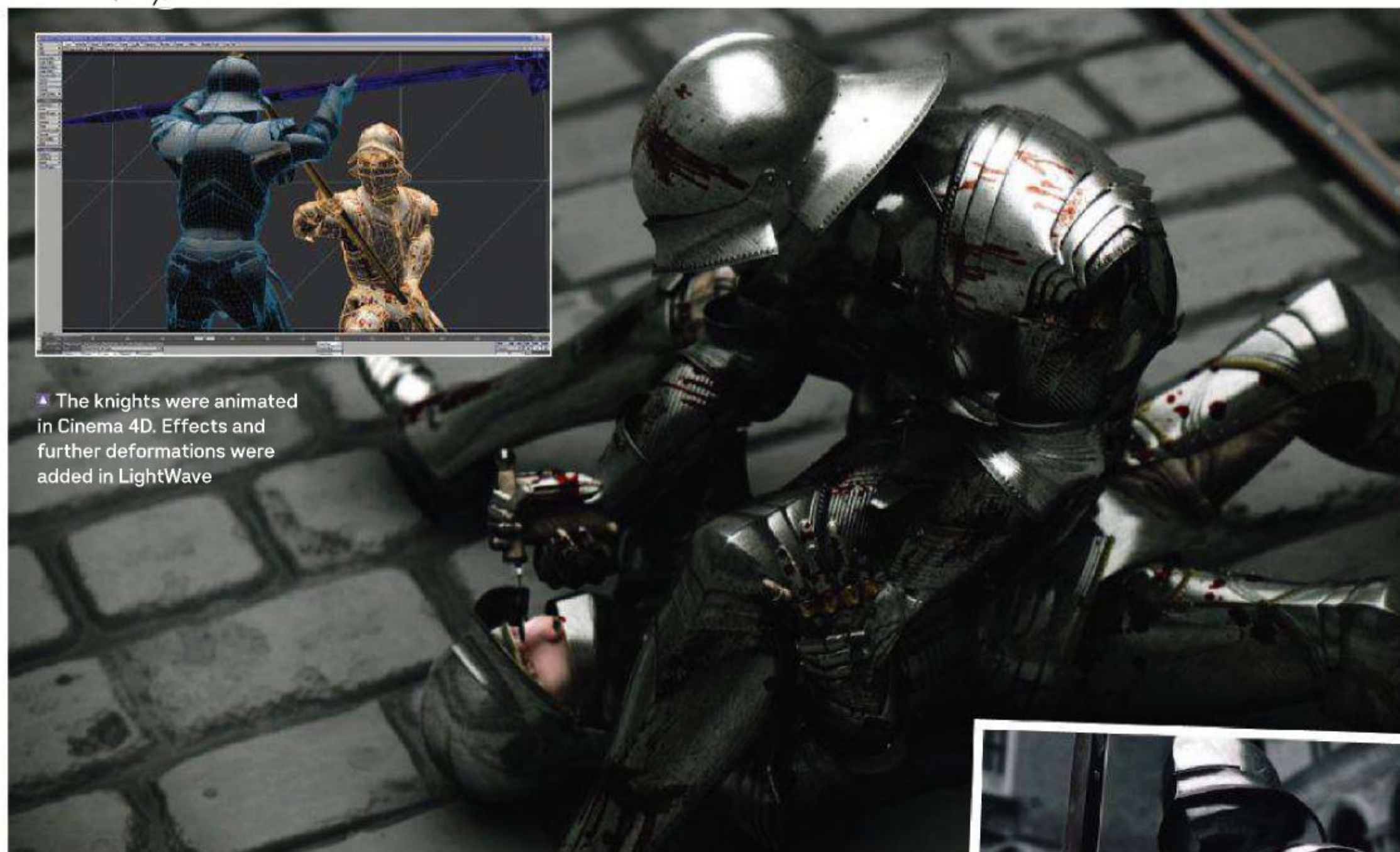
3. Observing
The medieval Fight Book describes a unique martial arts technique, and in order to transfer this to our animation, we »
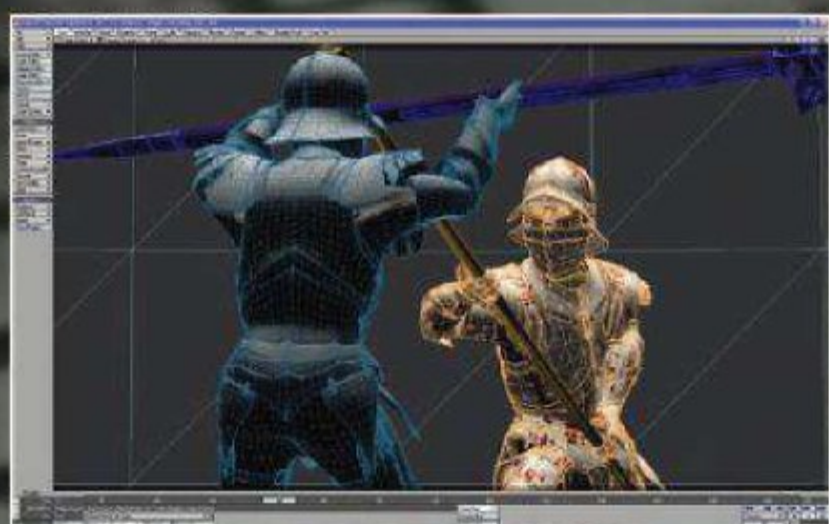
▲ The knights were animated in Cinema 4D. Effects and further deformations were added in LightWave

◩ Two fight sequences were created. One of the main challenges was rigging the characters, since it involved many hard moving parts and soft body surfaces that had to deform and move in a natural way
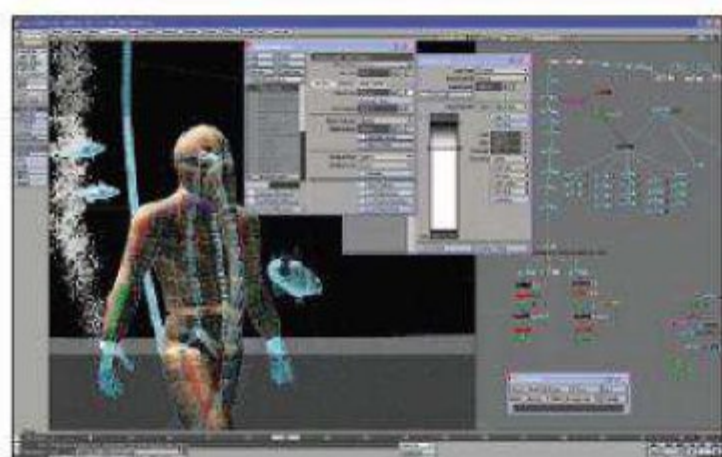
communicated online with John Clements, who is based in the US. He is a leading authority on historical fencing as well as one of the world's foremost practitioners and instructors of medieval and Renaissance fighting methods. John was constantly feeding

texturing, modelling, shading and lighting too. It's a common mistake among artists to start working without observing real life. Even if our subject is straight out of fantasy, there's always a reference out there in the real world that's worth studying.

> *"Some of the drawings in the book were unnatural in terms of real-life proportions and we tended to overcompensate for that with the digital model"*

us QuickTime clips showing what the book's drawings meant in terms of body movement.

We find that studying real-world elements thoroughly before starting to animate really benefits the end product. That applies to

◩ Animating the medieval diver in LightWave. The bubbles are particle-driven Hypervoxels

What we did wrong

1. We tripped up with facial stiffness
I failed to notice that the little opening on the knights' helmets would be enough to reveal the stiffness of their faces. I did worry that the lack of expressions on the faces would expose us, but the devil in me kept saying that with a bit of camera shake and a lot of motion blur it would be all right. Although this cheap trick sometimes works, it didn't in this case, but by then it was too late to do much about it. The only thing we could do was to redirect the shots in order to hide the faces as much as possible. The same thing the Beowulf guys did with his... Well, you know what I mean.

2. We were too eager to please
Often, we would finish something a bit earlier than the deadline. Feeling proud of what we'd done, we kept showing finished stuff to the client earlier than expected. This is risky,

since it can result in wasting any gained time on doing something that wasn't in the brief. In turn, this could result in a domino effect and hurt your other work. Thankfully, that didn't happen here, and we were still deprived of sleep for the last 48 hours before delivering.

3. We overused our artistic licence
In some cases, we got carried away by our creative inclinations. For example, some of the drawings in the book were unnatural in terms of real-life proportions and we tended to overcompensate for that when doing the digital model. In the case of the diver, this ended up costing us more than one change before the client approved it. In the end, the proportions of the model were wrong in terms of real life, but accurate in terms of the book, which was what the client wanted.

Lessons learned

We learned that with proper planning, many 3D applications can be used for the same project. Our pipeline is now really flexible, which helps in getting the best of what each different program can offer, plus it provides access to a broader talent base. These days, linear workflow is a standard addition to our process – once you do it, you'll never look back. Also, camera shake and motion blur won't always hide your imperfections... ●

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Freeze Frame
Key moments in VFX and animation history revisited on DVD

Birds of a feather

In 2006, Animal Logic made an impact with the first-ever CG animal musical. With Legend of the Guardians: The Owls of Ga'Hoole, it's in fine feather once again, says **Mark Ramshaw**

VITAL STATISTICS
Title Legend of the Guardians: The Owls of Ga'Hoole
Released
US: 17 December 2010
UK: 11 April 2011
Formats DVD and Blu-ray
Distributor
Warner Home Video
Watch for... The final showdown, with Soren and the Guardians facing off against Metal Beak's army

Animal Logic surprised everyone with its 2006 debut, Happy Feet, a fresh take on the CG animated feature film format that combined near-photorealism, song and dance numbers and an environmental message. But how to follow up such a successful gamble? With a battle-filled action adventure starring talking owls, of course...
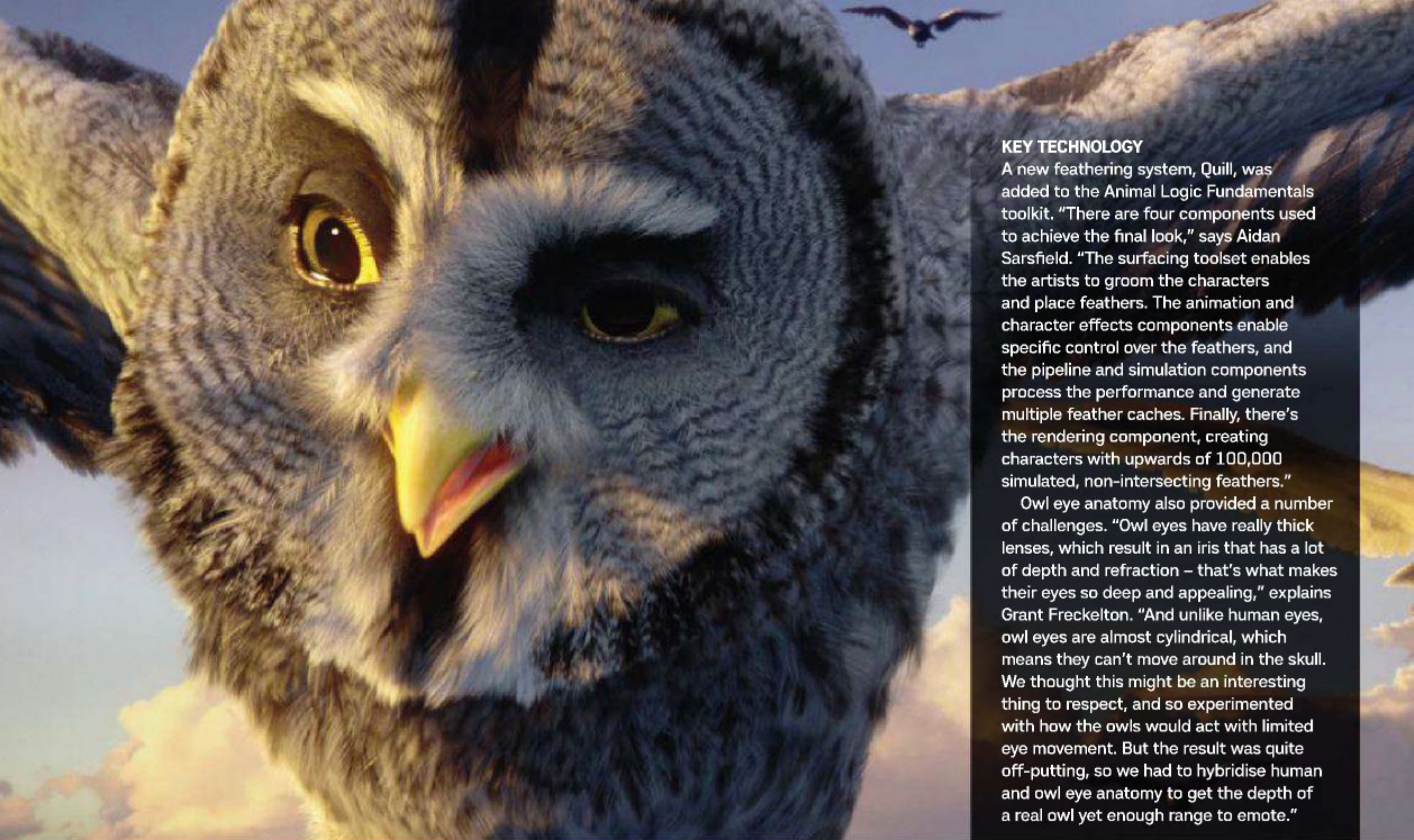
Katrina Peers, associate producer on Legend of the Guardians: The Owls of Ga'Hoole, says the project's genesis can be traced back to December 2006, when producer and Animal Logic co-founder Zareh Nalbandian was visiting the Warner Bros offices. "He came across the Kathryn Lasky books, which had been optioned by the studio, and brought them back to Australia. Production designer Simon Whiteley promptly read them during his Christmas break in Tasmania and – inspired by his surroundings – returned with his mind full of ideas about what this world could look like."

A small team, led by Whitely, began creating concept art and pulling together ideas for an animated test. Once Warner's interest had been piqued, the design team assembled further reference over in Tasmania, and started to develop combat concept frames, plus some environment and 3D fly-through materials.

"This package was presented internally at Warners, and to director Zack Snyder, who responded positively, particularly to the combat frames," says Peers. "He'd just come off the very successful 300, where he worked with Animal Logic on key sequences, and had developed a great working relationship with art director Grant Freckelton."

Once onboard, Snyder quickly helped bring a fresh aesthetic to the movie, in particular aiding Animal Logic in taking a more extreme approach with the art direction and action of what would otherwise be considered a children's story. "He also brought live action expertise that meant our camera work and lighting had a grounding in reality, even when we were pushing the scenes in a stylised direction," says Freckelton.

Animal Logic did toy with the idea of shooting live footage of trained owls and then doing Babe-esque beak replacement for the facial animation, but decided an all-CG approach would give total storytelling freedom. "Ultimately, it came down to a question of, 'What exactly do you capture?'" explains Freckelton. "Do you capture real owls, or do you capture human performance and map it onto the owls? With one, you've got the logistics of training, feeding and capturing a host of real birds, and the other isn't feasible because of the anatomical differences between a human and an owl."

While the studio wanted to create a near-photoreal feature, it took some work to decide how closely the film's feathered cast should mimic the form and function of real owls. "We did experiment with using the limitations of real owl anatomy to make the characters more interesting," says Freckelton. "Some aspects of reality we did keep, and we tried to respect hard surfaces as much as possible, but other elements did have to be altered... We made the brows more flexible than on a real bird, for example."

From a pipeline perspective, digital supervisor Aidan Sarsfield says Animal Logic's experiences on Happy Feet provided a huge leg up. "We'd gone from an almost standing start to a full CG animation pipeline in the space of three years, but we ensured our techniques and tools were as generic as possible so that they could be repurposed with minimal effort on our next project. So, despite the fact that we still had a huge amount of work to do, we had an extremely strong and reusable core from which to begin.

KEY TECHNOLOGY

A new feathering system, Quill, was added to the Animal Logic Fundamentals toolkit. "There are four components used to achieve the final look," says Aidan Sarsfield. "The surfacing toolset enables the artists to groom the characters and place feathers. The animation and character effects components enable specific control over the feathers, and the pipeline and simulation components process the performance and generate multiple feather caches. Finally, there's the rendering component, creating characters with upwards of 100,000 simulated, non-intersecting feathers."

Owl eye anatomy also provided a number of challenges. "Owl eyes have really thick lenses, which result in an iris that has a lot of depth and refraction – that's what makes their eyes so deep and appealing," explains Grant Freckelton. "And unlike human eyes, owl eyes are almost cylindrical, which means they can't move around in the skull. We thought this might be an interesting thing to respect, and so experimented with how the owls would act with limited eye movement. But the result was quite off-putting, so we had to hybridise human and owl eye anatomy to get the depth of a real owl yet enough range to emote."

In total, around 500 people worked on the movie. In addition to primary off-the-shelf applications Maya, Softimage, Nuke, Houdini, ZBrush and RenderMan, they also used a large number of proprietary plug-ins and tools, including ALF, the studio's node-based effects system. "It caters for everything from feathers to water simulation," says digital supervisor Aidan Sarsfield

As with Happy Feet, Legend of the Guardians combines a near-photoreal fidelity with an almost painterly colour palette and warmth. "GI, HDRI and subsurface scattering all have their place in the process when it comes to the final look, but what really drives the look of the end result is the direction of our art department," says Sarsfield

"Our camera work and lighting had a grounding in reality, even when we were pushing the scenes in a stylised direction"
Grant Freckelton, art director

That enabled us to manage and iterate more shots in parallel than ever before."

One thing that Happy Feet didn't prepare them for was the need to deck almost every major character in feathers. "Some of our first tests attempted to utilise the fur system created for Happy Feet to feather a bird, but it immediately became apparent that we'd need a significant amount of development to create a system that would give our surfacing team enough specific controls, while enabling the automation of the complex simulation required to make feather motion believable," says Sarsfield.

Peers acknowledges that Happy Feet and Legend of the Guardians have carved out a unique Animal Logic aesthetic, but stresses that the studio has no intention of being pigeonholed. "I'm sure you'll be surprised again at what comes from us next time around," she says. ●

"Simon Whiteley really pushed for the owls to be as realistic as possible and Zack Snyder didn't want the birds to act in a Disney-esque, anthropomorphic way, so we knew there were no wingtips as fingers and no overly expressive faces," says Freckelton

News with a view _

⬛ Pixar's first short was 1986's Luxo Jr, which features RenderMan shaders and shadow maps in its technical arsenal

⬛ Directed by John Lasset r, The Adventures of André and Wally B was made by The Graphics Group, a Lucasfilm subsidiary that later evolved into the start-up Pixar

Short and sweet

VFX master <u>Anders Beer</u> reveals why the early works of Pixar inspire him as much today as when he was a teenager

My Inspiration
Leading artists reflect on the work that shaped their lives in 3D

About the author
Anders Beer grew up just outside of Boston, MA. After starting with DreamWorks, he's worked at studios including Disney, Sony Imageworks and Digital Domain. Currently at Double Negative, he was the animation supervisor on the recently released movie Paul
dneg.com

When I was about 16, my father took me to visit the Boston Computer Museum. Having seen me sketch characters using a joystick on a commodore 64, he thought that something in the exhibitions might inspire me – and he was right. It was on this trip that I first saw Pixar's Luxo Jr and The Adventures of André and Wally B, two short films that focused my attention on computer animation throughout high school. It has never wavered since.

I had spent most of my life drawing and admiring illustration from the 1930s and 1940s. I thought that I was going to be an illustrator or animator in a field where all of the best work had already been done. I was a huge fan of the classic Looney Tunes and Merry Melodies shorts at the time; I think I felt overly nostalgic about that work. Suddenly, I saw that there was this whole new frontier, where compelling animated characters could be created in 3D and it looked like nothing else that had been done before. I knew instantly: that's what I wanted to be doing.

I bugged my parents relentlessly about getting a computer capable of running 3D animation software. They eventually gave in and I got my very own Amiga 500 with 2MB of RAM, which I used to start creating my own digital artwork. I went on to study animation and film at the School of the Museum of Fine arts in Boston for two years, then Cal Arts for two years, where my demo reel landed me my first job at the brand-new DreamWorks SKG Animation.

I still watch these early Pixar films today. They have definitely had an influence on my work, as I'm generally inspired by their storytelling and character craft. They are so well crafted: they can draw me in at any point in the story, even though I've seen them a dozen times.

My appreciation of the character animation principles Luxo Jr so purely exemplifies just seems to grow as the years go by. In 1986, it was a great animated short and, arguably, it appeared to be an even greater technological showpiece. When you see it today, the wow factor of the technology is entirely gone; but at the time, John Lasseter had huge limitations to overcome in order to create the performance he was after. He relied entirely on his craft and artistry to show the true potential of Pixar's tools, and created a short that is timeless despite its historical moorings.

Part of the attraction is seeing them again with more experienced eyes, knowing I will see things differently. I do the same thing with my own work: I revisit all of it over the years to see how my perception of it has changed. ●

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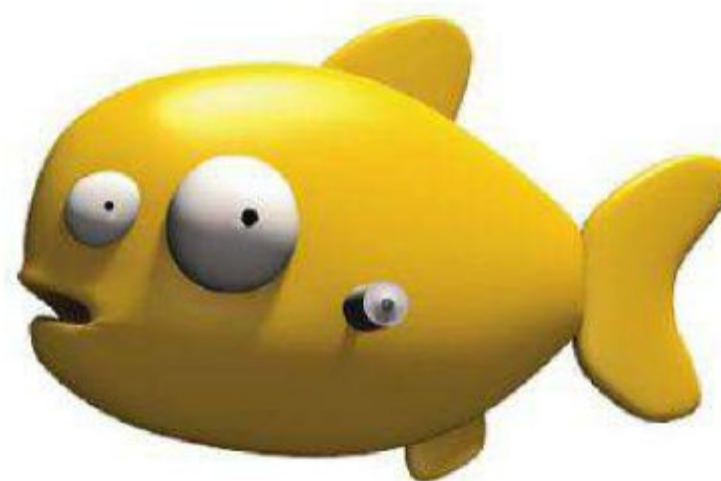
The madness of King George

As ILM brings its guns to bear on the full-length CG market, Roy suggests there's method in its madness

I magine for a moment that you're a hideously wealthy, 60-something filmmaker. The sort of filmmaker, say, who influences a generation with a trio of iconic science fiction movies and then, just for shits and giggles, goes on to establish a visual effects empire that sets the pace for the entire industry and eventually becomes almost comically ubiquitous – its name popping up at every awards ceremony and in the end credits for seemingly every Hollywood blockbuster for 20 years straight.

Now try to imagine how much wealth, knowledge, power and wisdom you'd have accrued over the years. Clearly you wouldn't be the sort of buffoon to believe in prophecies that the world will end in 2012. And yet that, we're told, is exactly why everybody's favourite Marin County-based industry visionary believes.

"George Lucas sits down and seriously proceeds to talk for around 25 minutes about how he thinks the world is gonna end in the year 2012, like, for real," comic actor Seth Rogan told a journalist recently. Naturally the story went viral in about the same time it takes to say "less than 12 parsecs", because, let's face it, we all love to think that the rich and famous – especially those whose more admirable exploits have been somewhat tarnished by buggering up both the Star Wars *and* Indiana Jones franchises in recent years – are completely, irredeemably bonkers.

As much as I'd love to believe that a big star like Rogan wouldn't make something like this up, he might not be the most reliable source that Hollywood has to offer. [Mimes inhaling deeply and rolling eyes back in their sockets.] Besides, Lucas clearly has bigger things on his mind than the end of the world.

With Rango, ILM's technicians might simply have been guns for hire this time around, but Georgie-boy must surely be looking at Pixar's success and thinking that's a piece of pie worth having. It can't be long before he realises that making entire CG movies in-house is easier and vastly more profitable than bidding for VFX jobs against the increasingly heavy hitters of Hollywood and Soho.

Small wonder, then, that there's more than a hint of sour grape in the reaction to Rango so far, with some giving it the kind of frosty reception you'd expect would be reserved for James Cameron at an eye patch convention. If we're to believe the naysayers, the visuals are 'ugly', 'angular' and 'unappealing'. What they really mean is that Rango is *different*. But, surely, in the increasingly generic world of computer-animated movies, this has to be a good thing?

Just how many cute animals with identikit smirks and human characters with faces as smooth a baby's arse do we have to endure? And don't get me started on the way the industry manages to throw up two takes on every single concept. A Bug's Life and Antz; Shrek and Monsters, Inc; A Shark's Tale and Finding Nemo; Madagascar and The Wild; Flushed Away and Ratatouille; Robots and Wall-E; Happy Feet and Surf's Up; Megamind and Despicable Me... Is it too much to ask the studios to at least check IMDb to see what the competition is up to before greenlighting a project?

At a time when even the usually dependable Pixar seems content to churn out the kind of sequel for which the phrase 'straight to DVD' was surely coined (seriously, Mr Lasseter: one film about redneck vehicles was already one too many), the appearance of a new hat in the ring is something to celebrate. Much as it pains me to cheer on the big guy, at least Lucas's mob is doing something different. A spaghetti western storyline? Bring it on. Expressive yet almost realistic creatures? About time, too. Photo-real rendering of a fantasy world? Loved it in Wall-E, and love it here. And as for any grumbling that ILM should stick to what it knows best, don't forget that pretty much every animation studio started out with live action. DreamWorks, Animal Logic, Blue Sky, Mac Guff... Even Pixar started out in effects (the latter back when, ironically, it was part of Team Lucas).

Still, if the world does end in 2012, at least we'll be spared the re-remastered Blu-ray Platinum Special Limited Edition Super-Extended 3D Star Wars box set that George is, no doubt, busy tinkering with for a Christmas 2013 release. ◉

About the author
Mental Roy has been lurking on the fringes of the 3D industry for years – usually fringes that contain pubs. We could tell you his real name, but then we'd have to kill you
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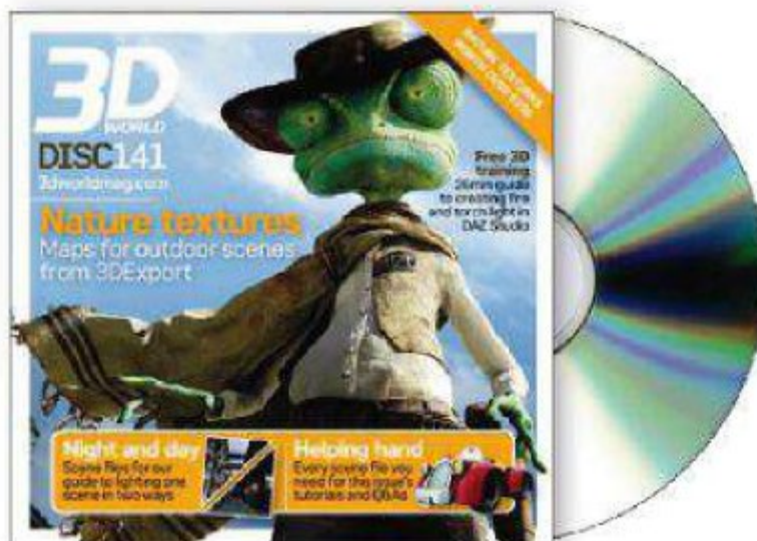**Worth $269**

Tutorial files
All the scene files you need this issue

The disc includes every scene files for this issue's tutorials, including our Maya and Mudbox guides. Visit **3dworldmag.com/141** to view the free accompanying videos.

▶ Mesh Factory supplies 3D content to the US military

Mesh Factory models
Two sample models in six formats

Mesh Factory offers over 700 distinctive 3D models in a selection of file formats. You can buy individual models, snag the entire collection on DVD-ROM or take out a subscription that includes all new models as well as existing objects.

Mesh Factory is a registered US defence contractor, supplying 3D content to the military. You can assess its pedigree in military-related assets with the weapon mount included on the disc, which is accompanied by an electric guitar. Both models are provided in six formats – 3DS, FBX, LWO, MAX, Maya MB and OBJ – with hi-res texture maps provided separately.

Please note that these models do not come with a commercial licence: please visit the Mesh Factory website for commercial purchase information.

FORMAT Various   **LICENCE** Personal

WEBSITE meshfactory.com

▶ This electric guitar is provided in six file formats

3DExport textures
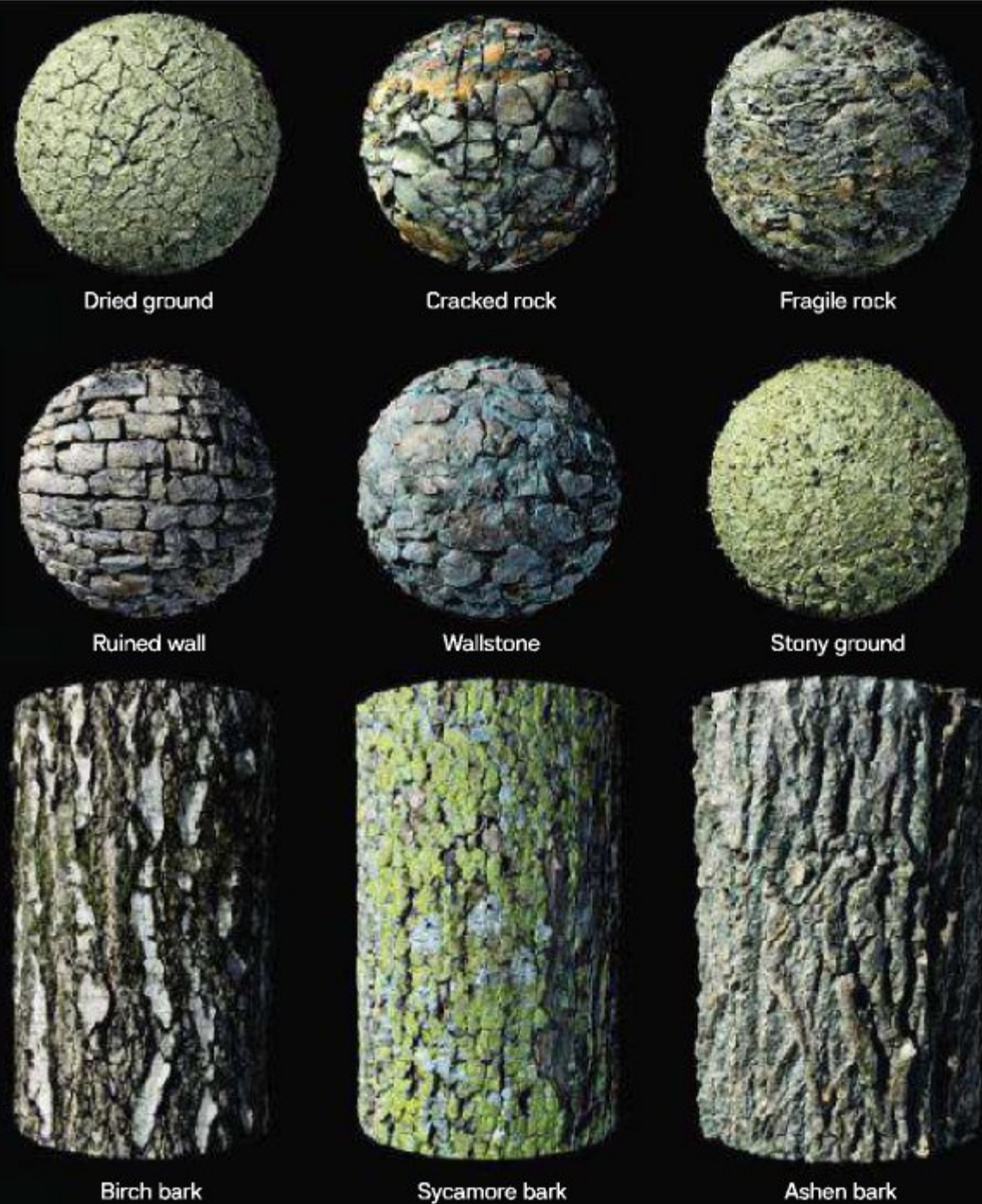## 25 nature-themed textures for outdoor scenes

3DExport offers a wide selection of 3D-related content, with over 20,000 models to buy, plus video training and e-magazines. But the focus of this issue's disc offering is 3DExport's texture catalogue. The 25 textures on the disc come from its 300-strong collection, and have a nature theme, with tiled rock and wood designs suitable for outdoor woodland or architectural scenes. Most are provided in BMP format, with colour, bump and displacement maps.

Visit the 3DExport website to explore its full catalogue and affordable pricing structure, then find out how you can offer your own assets through the website.

FORMAT BMP, JPEG **LICENCE** Commercial

WEBSITE 3dexport.com

▶ Just some of the 25 tiled nature textures that are yours to keep, courtesy of 3DExport

Dried ground

Cracked rock

Fragile rock

Ruined wall

Wallstone

Stony ground

Birch bark

Sycamore bark

Ashen bark

Dreamlight Club video tutorial
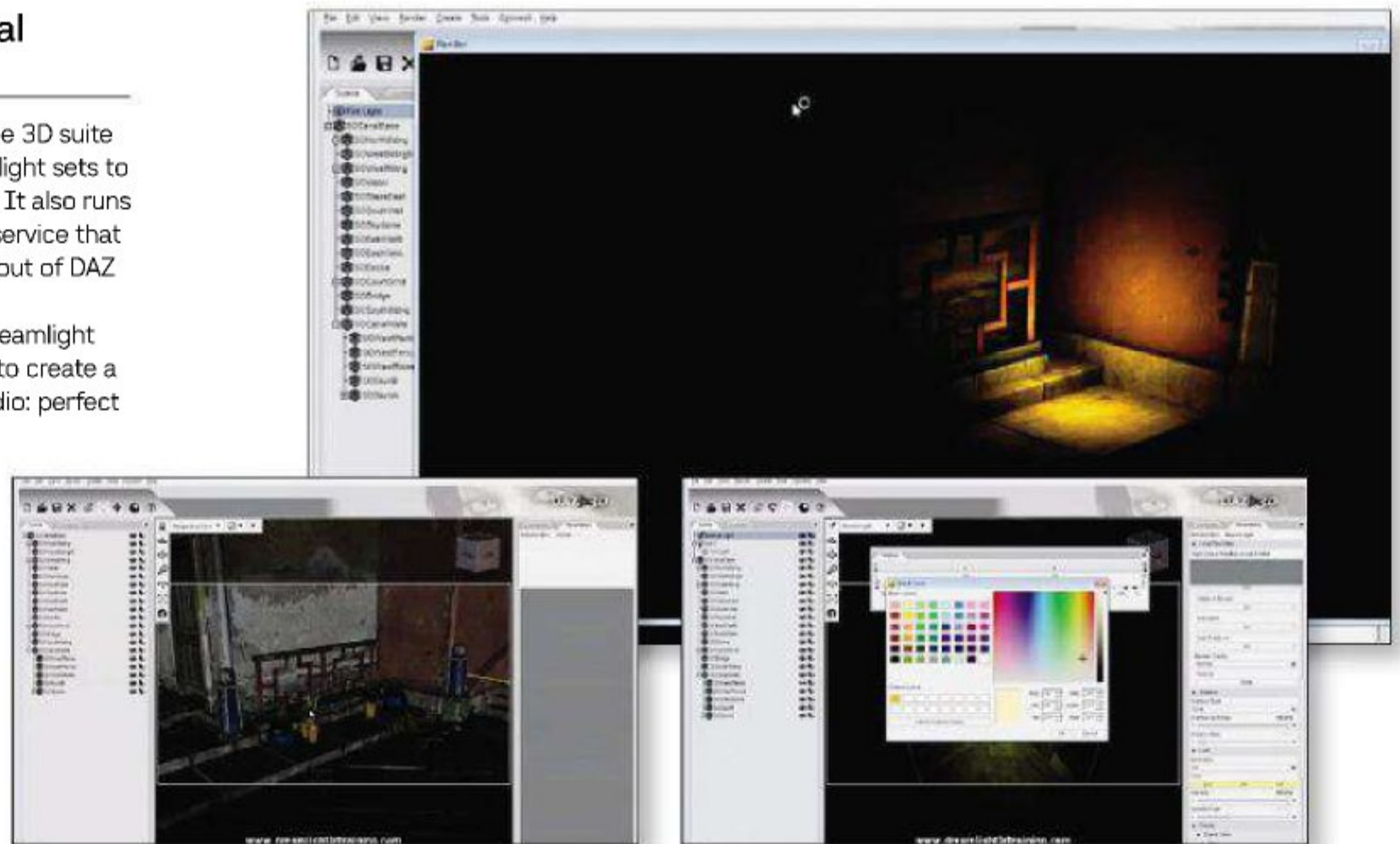### Create fire or torch light in DAZ Studio

Catering exclusively for DAZ's free-of-charge 3D suite DAZ Studio, Dreamlight offers plug-ins and light sets to extend the popular software's functionality. It also runs the Dreamlight Club, a subscription-based service that delivers regular video to help you get more out of DAZ Studio and Dreamlight's own assets.

In the 26-minute excerpt on the disc, Dreamlight founder Waldemar Belwon shows you how to create a realistic fire or torch light effect in DAZ Studio: perfect for ancient ruins or intimate settings. Visit the Dreamlight website to find out how you can subscribe to receive more training every month.

FORMAT MP4 **LICENCE** Educational

WEBSITE
dream-lounge.com/dreamlight

▶ Make this simple scene come alive as Waldemar Belwon shows you how to add fire or torch light in DAZ Studio

Soundsnap sound effects
50 effects for your animations or games

Soundsnap offers over 120,000 sound effects and royalty-free music loops, with many created by Hollywood sound designers and acclaimed DJs. The selection on the disc includes ambient and Foley sound effects and short and long music loops.

FORMAT WAV **LICENCE** Commercial **WEBSITE** soundsnap.com

soundsnap
50 WAV sound effects
soundsnap.com

On your free disc

THIS ISSUE Natural surface textures worth over $250, Mesh Factory 3D models in six file formats and 50 sound effects for your animation projects

Resources

3DExport textures
Rock, bark and more for your natural scenes with 25 textures

Mesh Factory models
Electric guitar and weapon mount, each in a choice of six file formats

Soundsnap sound effects
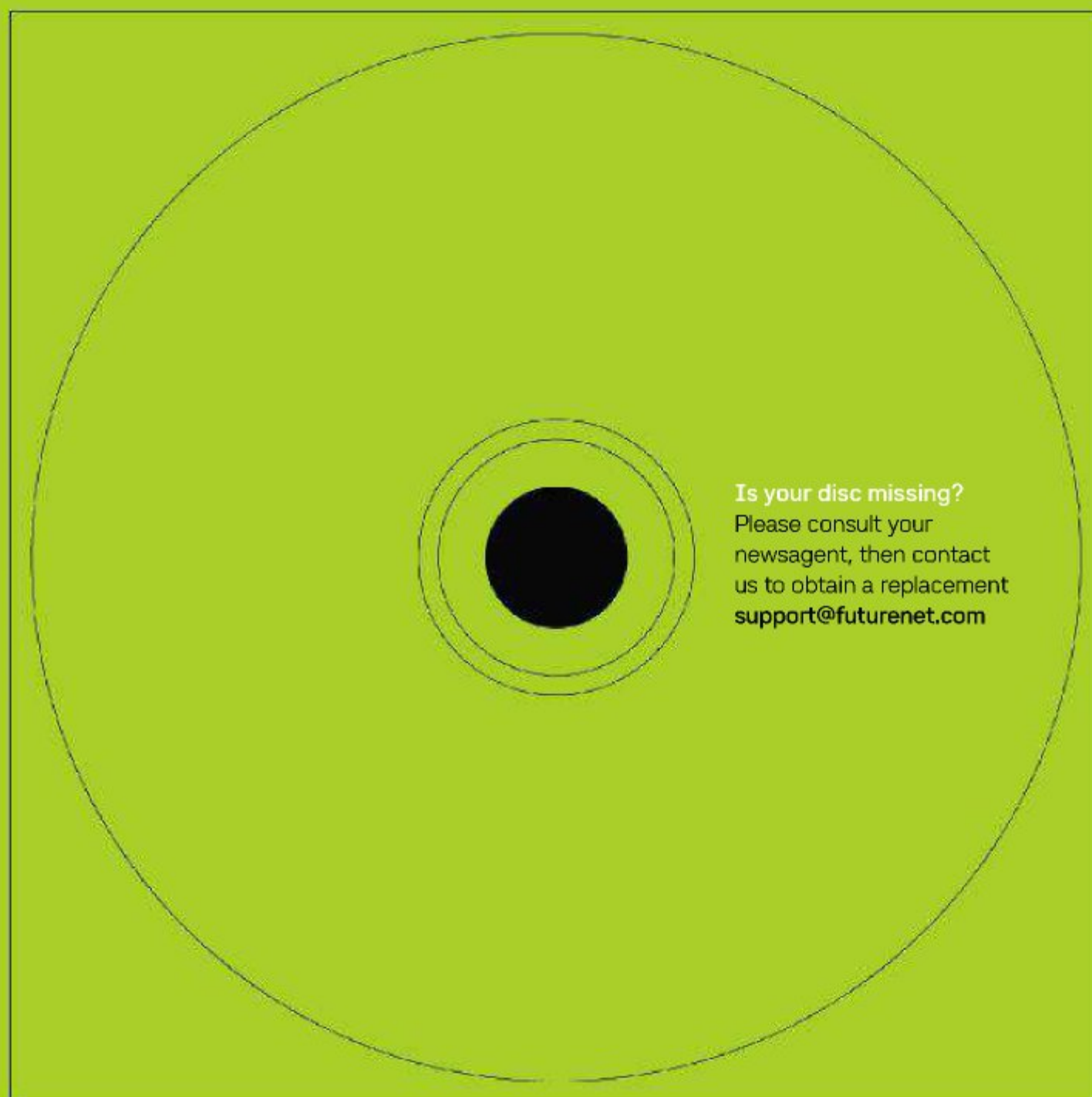Ambient, Foley, FX and music for your animation projects

Video training

DAZ Studio video training
26-minute guide to creating fire and torch light with Waldemar Belwon

Tutorials

All the scene files you need for this issue's tutorials and Q&A section are on the disc. Visit **3dworldmag.com/141** for videos for this issue's tutorials ands Q&As.

Is your disc missing?
Please consult your newsagent, then contact us to obtain a replacement **support@futurenet.com**

For a full listing of our disc content this issue, including file formats and system requirements, **turn to page 120**

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